MNB BULLETIN
October 2012

MAGYAR NEMZETI BANK

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The aim of the Magyar Nemzeti Bank with this publication is to inform professionals and the wider public in an easy-to-understand form about basic processes taking place in the Hungarian economy and the effect of these developments on economic players and households. This publication is recommended to members of the business community, university lecturers and students, analysts and, last but not least, to the staff of other central banks and international institutions.

The views expressed are those of the authors and do not necessarily reflect the offical view of the Magyar Nemzeti Bank.

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Summary

DEAR READER,

The Magyar Nemzeti Bank attaches great importance to making central bank analyses on various current economic and financial trends of general interest available to the wider public. The October 2012 issue of the MNB Bulletin provides an overview of households' perceptions about the security of the various payment methods; discusses the latest developments in the Federal Reserve's monetary policy; presents the 'early warning' system designed for use in macroprudential regulation by the central bank; takes an account of developments in external borrowing by the individual sectors; and analyses the debates about fiscal adjustment within the European Union. In addition, the current issue contains a report on the 11th Macroeconomic Research Workshop hosted by the Magyar Nemzeti Bank jointly with the CEPR and, for the first time, features an interview with Fabio Canova, professor at European University Institute, Florence.

In their article, Éva Divéki and Dániel Listár review the results of a representative survey, which asked the Hungarian public for their opinion on the security of payment instruments. The survey found that the Hungarian public considers bank cards to be the most secure electronic payment instrument. The positive perception of the bank card comes directly after the perceived security of traditional payment instruments: the yellow cheque and cash. Nevertheless, one of the key findings of the survey is that the less intensive use of state-of-the-art electronic payment instruments is not due primarily to security reasons, though such concerns may play a certain role, particularly in the case of online payment instruments. The authors point out that confidence in the various payment instruments relates mainly to familiarity and use and that the majority of the population expect their own account keeping bank to convey information relating to payment instruments.

Dániel Felcser and Kristóf Lehmann discuss the latest developments in the Federal Reserve's monetary policy. In the first stage of the crisis, the Fed rapidly embarked on interest rate cuts followed by several rounds of substantial quantitative easing. However, the marked monetary easing and the persistently low interest rates triggered mounting fears of inflation, calling into question the Fed's commitment to medium-term price stability. In response to criticism and to the risks relating to monetary policy, in January 2012 the Fed announced an explicit inflation target of 2 per cent to exploit the fact that a numerical inflation target improves the transparency of the central bank, helps to anchor inflation expectations and fosters consensus about the definition of price stability among policymakers. With this move, the Fed added key elements of inflation targeting to its monetary strategy. The announcement confirmed that inflation targeting is becoming increasingly popular and may be an attractive and efficient monetary strategy, even for the largest central banks.

The new Hungarian Central Bank Act passed at the end of 2011 delegated macroprudential regulatory powers to the MNB. This issue is discussed in detail in the article by Dániel Holló. The author argues that an effective macroprudential policy requires the use of analytical tools which make it possible to quantify the effects arriving via different systemic risk channels and regulatory instruments which can help in the management of systemic risks. Among the four analytical tools tuned to identify and measure systemic risk two are already in regular use at the MNB, a contagion model is currently under development and the 'early warning' system is about to be introduced. The article presents the fourth tool in the list. The 'early warning' system may help in the identification of periods characterised by excessive credit growth and the accumulation of critical imbalances on the banking sector's assets and liabilities side as a result of excessive bank lending (excessive credit growth channel of systemic risk), and may serve as a point of reference for the timing of the introduction of measures named in the new MNB Act to reduce systemic risk (e.g. anti-cyclical capital buffer and other regulatory instruments designed to prevent excessive credit growth).

The article by Péter Koroknai and Rita Lénárt-Odorán examines developments in the external financing of the Hungarian economy from the perspective of external borrowing by individual sectors. During the crisis, domestic

demand fell and the previous high deficit on the balance of payments turned into surplus. This also means that, due to a rise in the savings of economic agents, Hungary no longer has to rely on external borrowing and net repayment of loans taken out earlier is underway, i.e. earlier borrowing is being followed by an outflow of funds. However, repayment of external funds is not occurring in each sector. On the one hand, the repayment of loans granted to the private sector triggered a sizeable outflow of funds from the banking system, while on the other hand, there was hardly any change in net external funds granted to the corporate sector; at the same time, the consolidated general government continues to borrow. The adjustment process, which started after the crisis, is likely to continue in the years to come, and this may lead to a further increase in the external surplus of the economy and an acceleration of outflows of foreign funds.

In his article, Zoltán Szalai analyses the debates on fiscal adjustment within the European Union. He argues that in response to increasing market pressure, EMU countries embarked on a robust consolidation process in 2010 in order to reduce their fiscal deficits and sovereign debt levels. Although the most heavily indebted countries – relying on external help in a number of cases – have been implementing aggressive adjustment programmes, their GDP-proportionate sovereign debt is unlikely to change or change very much this or next year. Consequently, a debate has evolved over the effectiveness of fiscal tightening. The article takes a brief overview of the debates about the success of crisis management in Europe and, within that, the effectiveness of fiscal consolidation.

The current issue of the MNB Bulletin contains a report on the 11th Macroeconomic Research Workshop held at the Magyar Nemzeti Bank jointly with the Centre for Economic Policy Research on 6–7 September 2012. The title of the workshop was 'Microeconomic Behaviour and its Macroeconomic Implications During the Financial Crisis'. The subject is highly topical, as economic policymakers try to understand the impact of the financial crisis on different economic agents and tailor their response to it. The keynote speakers of the event were professors Christopher D. Carroll (Johns Hopkins University) and Matthew D. Shapiro (University of Michigan), who are renowned for their work which establishes the importance of agent heterogeneity and microeconomic behaviour for macroeconomic outcomes. The event brought together researchers from both the academia and policy-making institutions, who presented their thought-provoking research which both empirically documented the importance of agent heterogeneity, and attempted to theoretically model its aggregate implications in the corporate, housing, banking sectors and labour markets.

Finally, for the first time in the series, the current issue contains an interview with Fabio Canova, professor at the European University Institute, Florence. Professor Canova has held consultancy positions with the Bank of England, the European Central Bank, the Banca d'Italia, the Banco de España and the International Monetary Fund. He is also programme director of the Budapest School of Central Bank Studies at the Magyar Nemzeti Bank. His main research areas include quantitative macroeconomics, monetary economics, time series analysis and forecast, international business cycles and the economic policy of growth. He has published over 70 articles in international journals and his graduate textbook, Methods for Applied Macroeconomic Research, was published by Princeton University Press in 2007. Professor Canova has been ranked in the Econometrics and Applied Econometrics Hall of Fame and in the Top 100 most productive economists. It is planned that future issues of the MNB Bulletin will feature interviews with famous economists.

The Editorial Board

Éva Divéki and Dániel Listár: Better safe than sorry: views of the Hungarian public on the security of payment instruments

Our survey found that the Hungarian public considers bank cards to be the most secure electronic payment instrument. The positive perception of the bank card ranks immediately behind the perceived security of traditional payment instruments: the yellow cheque and cash. Nevertheless, one of the key findings of our article is that the less intensive use of state-of-the-art electronic payment instruments is not due primarily to security reasons, although such concerns may play a certain role, particularly in the case of online payment instruments. The sense of security in payment instruments relates mainly to familiarity and use. That is, consumers consider payment instruments they know and use to be safe, while lesser known and little used ones are perceived as less secure. Consequently, the use of cashless electronic payment instruments can be intensified mostly through the dissemination of information, which will elevate the sense of security in consumers as well. The majority of the population expects their own account keeping bank to convey information relating to payment instruments.

INTRODUCTION

The increased use of state-of-the-art cashless electronic payment instruments may be hindered by the public's perception that they are not secure enough and by consumers' lack of awareness of their rights, duties and options in the event of fraud. Media news and hearsay may also influence users of payment instruments and determine the attitude of potential users.

Therefore, the Magyar Nemzeti Bank (MNB, the central bank of Hungary) initiated a broad-based consumer survey to assess consumers' specific security-related knowledge about various payment instruments (mainly electronic payment instruments) and to find out the attitudes of potential users to such instruments. One of the survey's objectives was to determine the reasons for not using electronic payment instruments, and to determine whether security-related expectations featured among these.

In this study, we present a brief overview of the international literature of payment instruments, the issues raised and the conclusions that can be drawn. This is followed by a discussion of the survey's methodology, and then the description of our main findings. We analyse the opinions of respondents on the security of the various electronic payment instruments, in particular payment cards (hereinafter: bank cards or cards) and online payment solutions as well as payment accounts (hereinafter: bank accounts). Furthermore, we elaborate on the relationship between awareness and use of the various payment instruments and their perceived security. In these sections, we also discuss data obtained from other data sources of the central bank, in particular official reporting of payment service providers (hereinafter: banks) that are relevant for our purposes. We also highlight differences between the findings of the survey and the data from other sources. We point out the security considerations that should be taken into account when using the various electronic payment instruments. Finally, we end with a summary of the key conclusions of the survey.

HOW DOES THE SENSE OF SECURITY AFFECT THE USE OF PAYMENT INSTRUMENTS?

There is no consensus in the international literature on whether consumers' perception of security affects the choice between payment instruments, and if so, how and to what extent. Until now, no study had investigated these issues in detail in Hungary.

In their theoretical model, Bolt and Chakravorti (2008) contrast the cost of the loss of cash (e.g. robbery) with the cost of bank cards, which are considered much safer, and they conclude: from the aspect of consumers, the probability of the loss of cash determines the optimum level of bank card fees.

Yin and DeVaney (2001) use empirical methods to analyse in detail the relationship between consumers' sense of security and the choice between payment instruments, but they find no empirical evidence that consumers who consider security more important would be more inclined to choose (debit) cards over cash. Schuh and Stavins (2009) rely on the data of a consumer survey on the choice between payment instruments and use an econometric model to conclude that safety orientation has only a limited role in consumer decisions.

Cheney (2006) arrives at a different conclusion; drawing on the results of a survey explained in a workshop she claims that for consumers, security and convenience are the two most important factors when choosing between payment instruments. Several surveys conducted in the US (Eisenstein, 2008; Federal Trade Commission, 2007; Unisys, 2009) conclude that Americans claim to be concerned about the safety of payment instruments and potential fraud, and this concern is stronger than fears of terrorism, personal safety and various viruses.

The study by Kosse (2012) relies on daily transaction data and newspaper articles on the subject to examine the effects of newspaper articles about bank card fraud on bank card usage. The author concludes that the effect is small and short term compared to other factors; still, he thinks that the impact on the efficiency of low-value payments must not be underestimated.

Regarding Hungary, the study looking at the payment habits of Hungarian households (Takács, 2011) establishes that more intensive usage of electronic channels is now a possibility, instead of the heavily cash-oriented Hungarian payment methods, so that the majority of households could execute their payment transactions more efficiently. Despite this, four fifths of typical retail transactions occur in cash.

In light of the above, it is worth considering the role which the perception of the various payment instruments, in particular the sense of security, plays in the decisions of the Hungarian public in addition to the other factors identified in literature (see Chart 1).

Chart 1
Major factors of choice among payment instruments

The sense of security is the consumer's subjective perception of the level of his concern about suffering a (financial) loss when using various payment instruments. One element of this is whether the consumer is concerned that he will not receive the product or service, the other element is the fear of falling victim to some kind of fraud when using the payment instrument. A high degree of a sense of security means that the consumer has no concerns relating to the payment instruments and is not afraid of suffering any (financial) loss by using the payment instrument; a low sense of security means the opposite. As the sense of security is a subjective judgement, it is irrelevant which payment instrument experts consider the most secure at the current level of technology.

THE FRAMEWORK OF THE CONSUMER SURVEY

The consumer survey was conducted in the spring of 2012 by GfK Hungária Kft. on behalf of the Magyar Nemzeti Bank. The sample of one thousand interviewees is representative of the Hungarian population aged 15–69, in terms of gender, age, type of settlement and region. The methodology and the summary of the responses to questions is attached in the Appendix; the body of the article contains the analyses and calculations based on the detailed responses as well as other information related to the subject.

OPINIONS OF RESPONDENTS ON THE SECURITY OF PAYMENT INSTRUMENTS

The first important question relating to the outcome of our survey is how secure respondents consider the various electronic payment instruments and to what extent that subjective perception corresponds to reality. To this end, we compare below the responses to the questionnaire with the fraud statistics available to the MNB. In the analysis, we first focus on the security of bank cards as the best known and most widely used electronic payment instrument and then turn our attention to online payments.

Fraud events relating to electronic transactions

Interviewees reported few actual losses relating to electronic payments, but the MNB statistics show that the real value is an order of magnitude smaller than the responses would have us believe.

Compared to the total number of payment transactions, the annual ratio of fraud events relating to bank cards, online banking, telebanking and mobile banking was very low, at around 0.003 per cent in the period examined (between 2007 and 2011). Thus, according to the statistical data, electronic payments are very safe.

Nevertheless, 6 per cent of the participants claimed that they or an familiarity of theirs had suffered financial losses in connection with bank card usage. The ratio is 3 per cent for online credit transfers and 1 per cent for other electronic payment options. Even though the fraud ratios calculated from the MNB data are not fully comparable with the charts from the survey (which also has an error margin), on the whole we can conclude that the subjective sense of security of the population is somewhat worse than the real situation.

This may be attributable to the following factors:

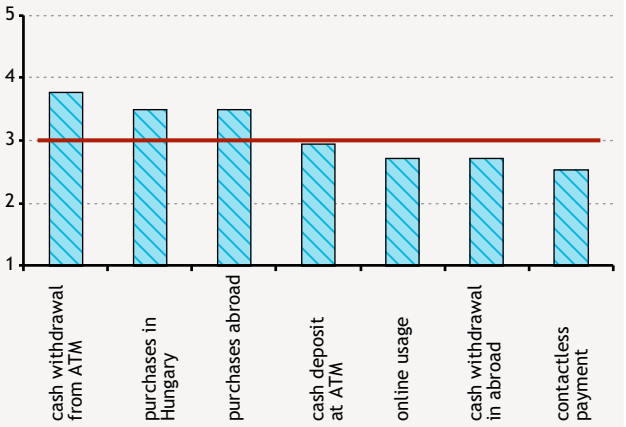
- the questions asked ('Have you or a personal familiarity of yours suffered a financial loss while using the following payment instruments?') had no time horizon;
- the range of fraud perceived by the public is wider than the coverage of the MNB data collection;
- in general, people have an exaggerated view of fraud, which may be partly due to the negative information published in the press and various online media.

Safety of bank card usage

64 per cent of respondents feel that bank cards are very safe or fairly safe payment instruments. Only 7 per cent think that bank cards are not at all safe or rather unsafe.

In respect of bank card transactions (see Chart 2), respondents considered that cash withdrawal from ATMs is the safest (on a scale of 5, the average is 3.78), followed by purchases in Hungary and abroad (no difference between the two, at 3.50). They deem that contactless payment is the least safe (2.54), preceded by online use and cash withdrawal abroad (2.7).

Chart 2
Perception of the security of various forms of bank card payments, on a scale of one to five



Source: MNB.

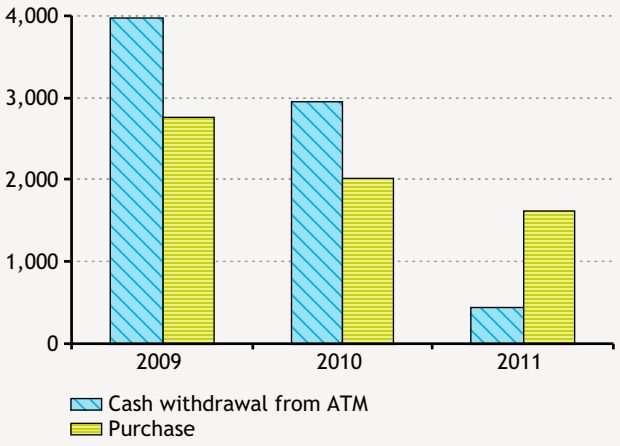
The statistics collected by the MNB indicate that fraud relating to cash withdrawal from ATMs and purchases using bank cards has declined significantly in recent years (see Chart 3). While fraud related to cash withdrawal from ATMs used to be more common than fraud relating to purchases up to 2010, the situation had reversed by 2011.

Only one third of cardholders (33 per cent) think that chip cards are safer than magnetic stripe cards even though chip technology was introduced on bank cards for considerations of safety. As a result, the number of fraud events declined, as evidenced by statistics.[1] Every third cardholder considers both solutions safe (35 per cent), while 8 per cent think that magnetic stripe cards are safer (see Chart 4).

Almost every second cardholder thinks that the use of the PIN is safer than signature, but 28 per cent consider both to

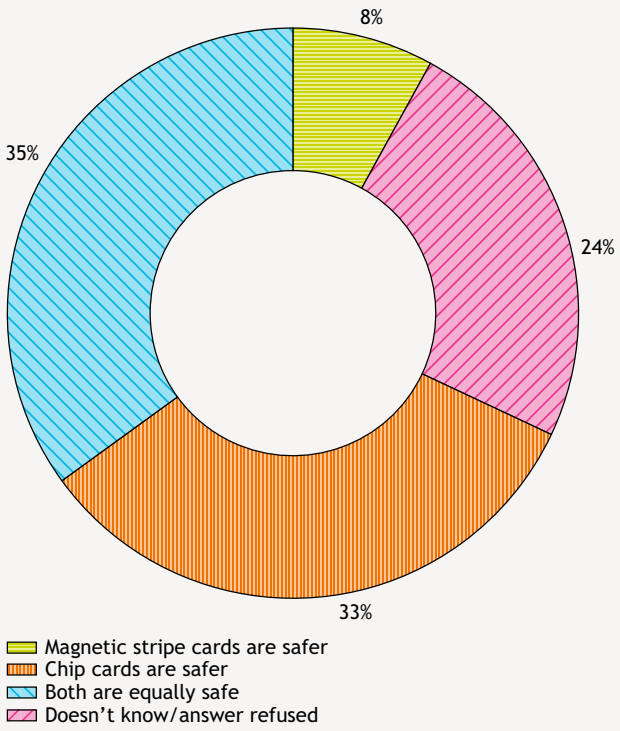
[1] This issue is discussed in detail in section 2.2.1 of the MNB publication *'Report on Payment Systems 2012'*.

Chart 3
Number of bank card related fraud events



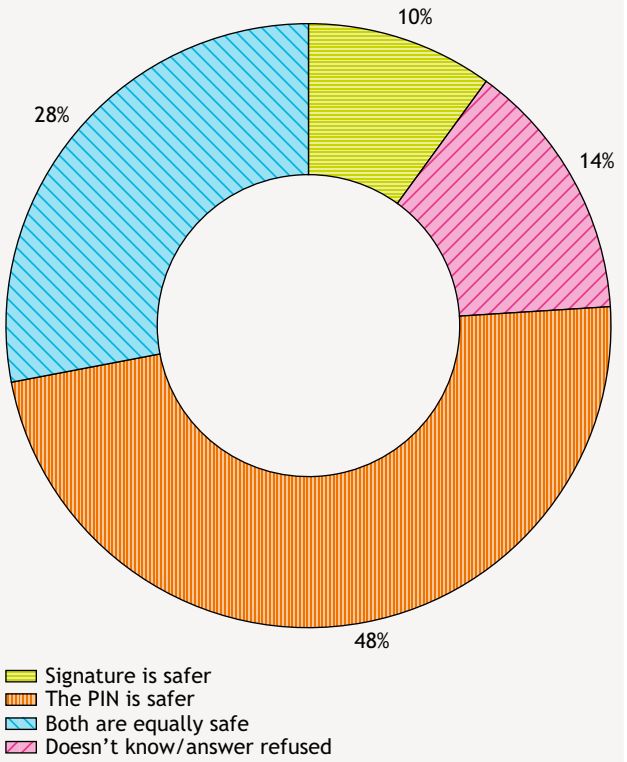
Source: MNB.

Chart 4
Perceived security of chip cards and magnetic stripe cards among cardholders



Source: MNB.

Chart 5
Perceived security of PIN and signature secured bank cards among cardholders



Source: MNB.

be equally safe (see Chart 5). In reality, the use of the PIN is safer than signatures.

Every cardholder agreement provides that if the cardholder becomes aware of transactions indicative of unauthorised card use (for instance from a text message from its bank or an entry in the bank statement), or his card or the PIN has been lost or stolen, he must notify the issuer without delay.

If the lost or stolen bank card is used without authorisation, any loss incurred before such notification is borne by the cardholder up to HUF 45,000 (assuming that the loss was not the result of the intentional conduct or gross negligence of the cardholder); any additional loss is borne by the issuing bank. Any loss incurred after notification must be borne by the issuing bank.

None of the respondents was aware of this 'forty-five thousand rule'. Only 7 per cent of the public (one tenth of cardholders) knew that the loss is shared by the bank and the cardholder and that there is a cap on the loss to the customer. In view of this, it is a positive aspect that 96 per cent of cardholders would report any suspicion of bank card fraud as soon as possible, and 90 per cent of them would notify their issuing bank.

In any event, banks have considerable responsibility relating to the security of payment instruments as 76 per cent of the respondents expect their own account keeping bank to inform them about security issues too.

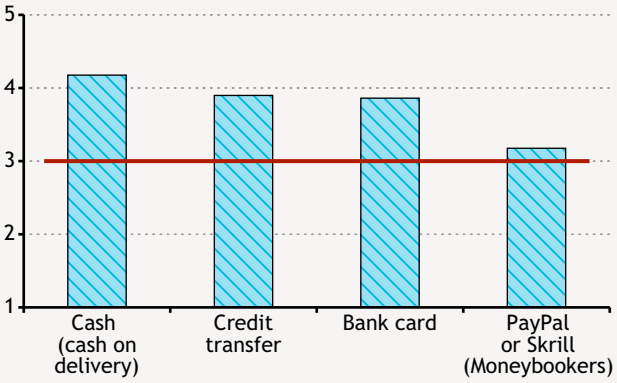
One lesson from the focus groups was that knowledge transfer and personal example stimulate usage. That is, if consumers use the various payment instruments, they have information and practical experience about them and they exchange these with their peers, the use of such solutions will be more intensive – this is true not only for bank cards but for other electronic payment instruments as well.

Security of online payment instruments

Of the survey participants, 65 per cent claimed to have internet access (this result is broadly similar to the findings of other similar surveys[2]). The ratio of persons using the internet for payments is much smaller: online credit transfers are used by 19 per cent of respondents, online purchases with electronic payments by 11 per cent, and internet purchases with cash payments by 21 per cent.

For purchases made on the internet, cash arrangements (e.g. cash on delivery) are considered to safest, with a score of 4.18 on a scale of 1-5. For internet purchases, credit transfers (3.89) and online bank card usage (3.86) are deemed to be safer than average. Payment via PayPal or Skrill (Moneybookers)[3] is considered to be the least safe (3.18 – average safety), (see Chart 6).

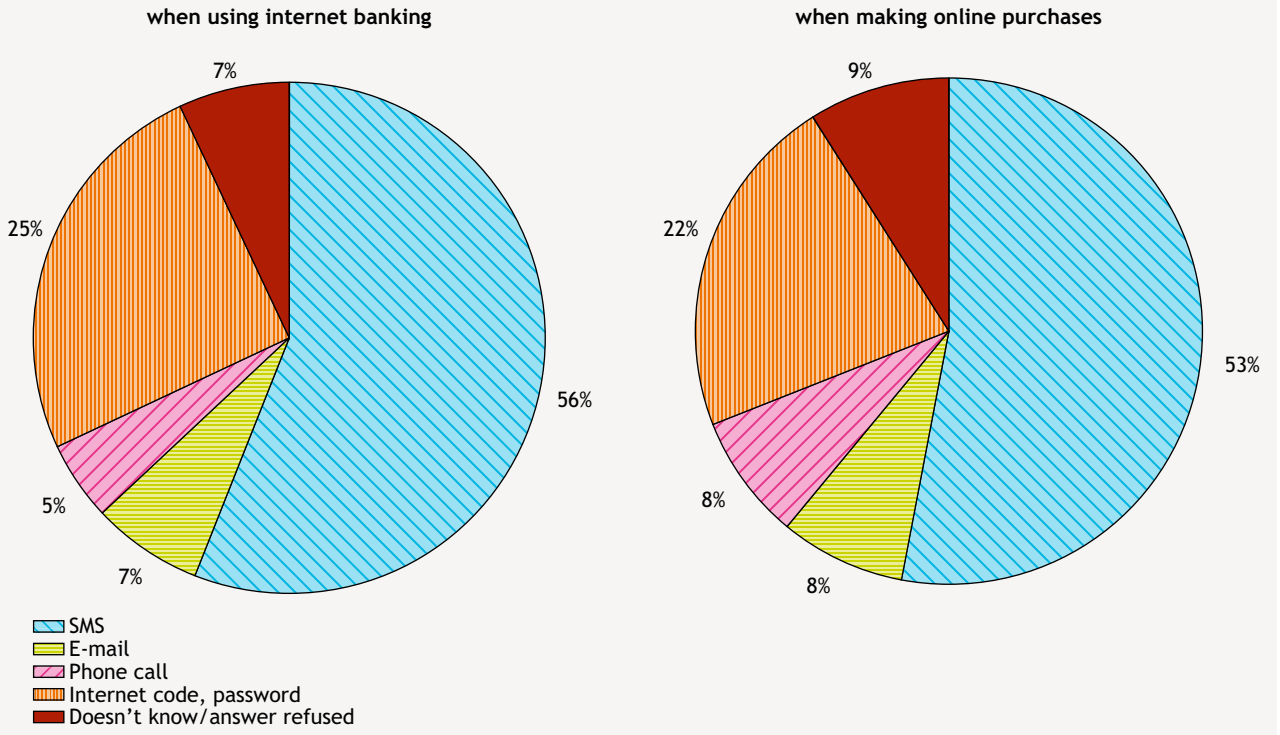
Chart 6
Security of payment instruments for purchases on the internet, on a scale of five



Source: MNB.

It is also important to find out what confirmation respondents consider reassuring when making purchases via the internet. More or less the same types of confirmation are considered

Chart 7
Security features considered satisfactory for internet banking and online purchases



Source: MNB.

[2] http://www.internetworldstats.com/eu/hu.htm

[3] PayPal and Skrill (Moneybookers) are payment systems facilitating online credit transfer from accounts opened with them.

satisfactory when using internet banking or making internet purchases. More than half of the respondents consider confirmation through text messages (SMS) adequate, while every fourth or fifth persons favours internet codes or passwords. Less than 10 per cent each mentioned e-mails or phone calls.

It is also important what persons making online payments do for the security of the computer they use. Only 14 per cent of interviewees admitted to doing nothing for security. Others (53 per cent) mentioned the use of security software (e.g. firewall, antivirus software), or the fact that they would not use computers in public places (e.g. internet cafés) for such purposes (45 per cent).

RELATIONSHIP BETWEEN THE FAMILIARITY AND USE OF PAYMENT INSTRUMENTS AND THEIR PERCEIVED SECURITY

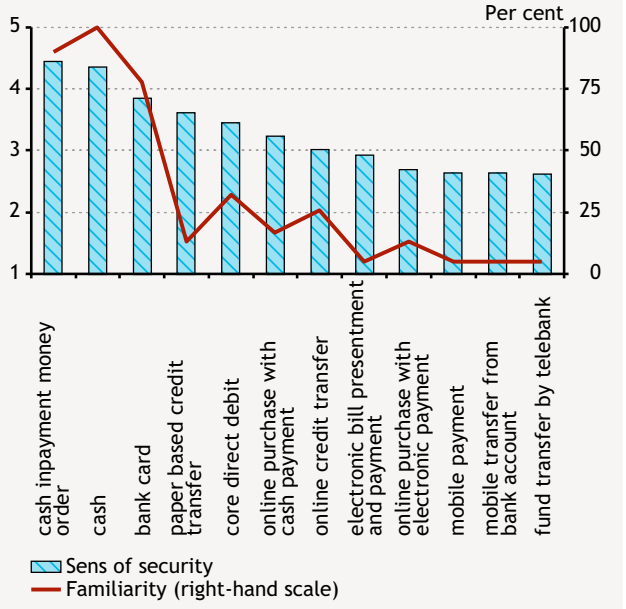
One objective of our analysis was to find out if there is any relationship between the awareness and usage of various payment instruments and their security, if there is, in what direction and what role the sense of security plays in consumer decisions when choosing between payment instruments.

Relationship between the familiarity of payment instruments and their perceived security

Based on the indicator measuring the familiarity of payment instruments (spontaneous recall, or marked 'very well known' from a list), the best known payment instrument is cash (100 per cent), followed by the postal inpayment money order – generally known as the 'yellow cheque' – (90 per cent) and bank cards (78 per cent), while other instruments of payments are much less known. It should be noted that core direct debit (32 per cent) and online credit transfer (26 per cent) have a considerably higher profile than paper-based credit transfer (13 per cent), which may indicate that even if slowly, more modern payment instruments are increasingly recognised.

There is close interdependence between the familiarity of a payment instrument and its perceived security. The more respondents are acquainted with a payment method, the safer they consider it to be and vice versa.

Chart 8
Relationship between the familiarity of payment instruments and their perceived security



Source: MNB.

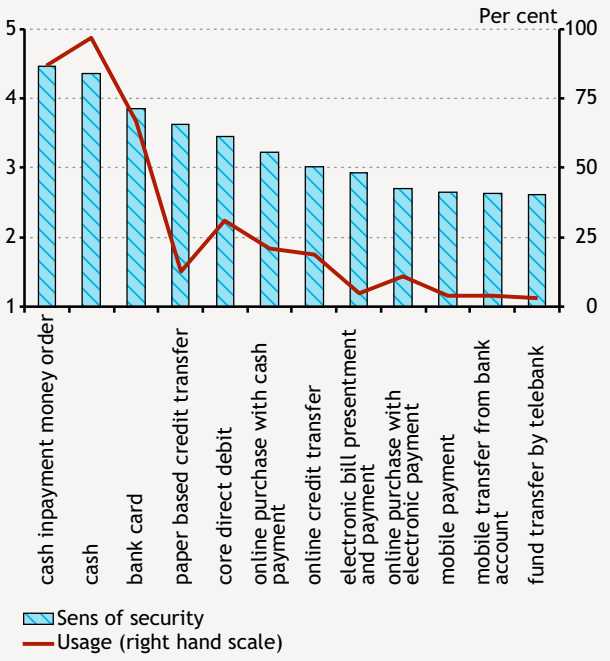
Relationship between the usage of various payment instruments and their perceived security

The ratio of use of the various payment instruments is very similar to the familiarity ratios discussed above. Of the respondents, 97 per cent use cash at least once a year, 87 per cent use yellow cheques and 67 per cent bank cards, while the use rate of other payment instruments is much lower. It is worth noting that the use of core direct debit (31 per cent) and online credit transfer (19 per cent) is higher than that of printed paper-based credit transfer (13 per cent).

There is also close interdependence between the use of a payment instrument and its perceived security. The more respondents use the payment instrument, the safer they consider it to be and vice versa (see Chart 9).

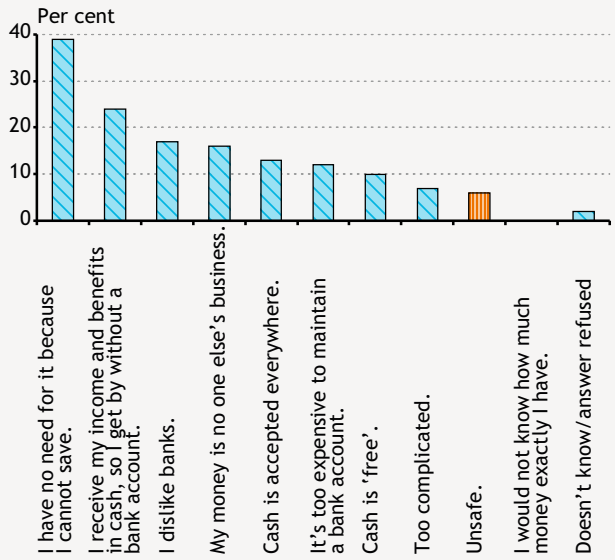
In summary: there is close interdependence between the familiarity and use of various payment instruments and their perceived security. The next step is to establish the direction of the dependence: is the non-use of certain

Chart 9
Usage of payment instruments and their perceived security



Source: MNB.

Chart 10
Causes of non-use of bank account



Source: MNB.

payment instruments attributable primarily to security concerns or to other factors.

Factors hindering the wide-spread use of payment instruments

It is worth examining why some respondents have no bank accounts, as the existence of a bank account is a kind of 'entrance ticket' to state-of-the-art electronic payment instruments.

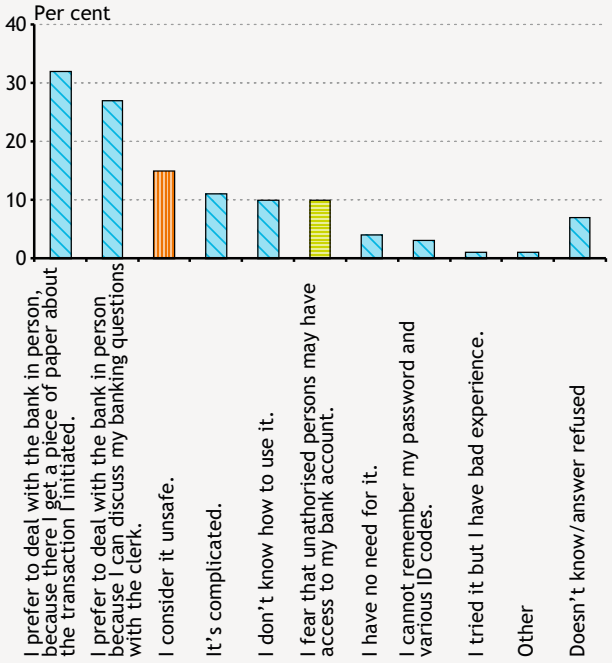
Our survey revealed that 76 per cent of the respondents have bank accounts. It is mostly due to financial considerations that some people do not use bank accounts. 39 per cent of persons without bank accounts claimed that they did not need one as they spend all their money and are unable to save. The main demographic characteristics of persons without bank accounts: average age of 40 years, not employed[4] (76 per cent), highest school qualification not exceeding secondary school (99 per cent), low net income of HUF 0-60,000 (61 per cent), live in villages or small towns (72 per cent). A high percentage, 24 per cent responded that they received their income in cash. Only 6 per cent answered that they did not open a bank account because they consider it unsafe.

The non-use of internet banking (also known as e-banking) is mostly due to reasons other than security concerns. Respondents do not use e-banking because they prefer to do their banking in person because they 'receive a piece of paper' about the transaction (32 per cent) or they can discuss their banking issues (27 per cent). Clear-cut security concerns were only cited by 15 per cent of respondents. If we add to this the essentially similar statement 'I fear that unauthorised persons may have access to my bank account', we find that the ratio of persons who selected at least one of the security concerns is 23 per cent on aggregate, but still lower than the causes mentioned in first and second place.

In the group that uses the internet for making purchases but does not choose modern electronic payment instruments but rather settles payment with cash on delivery, an outstanding 62 per cent responded that 'because I am sure to receive the goods, I only pay when the product is delivered'. This shows mistrust in the merchant rather than concern about the payment instrument. Thus, the increased use of electronic payments for purchases through the internet cannot be expected to occur automatically. A solution to this problem could be an

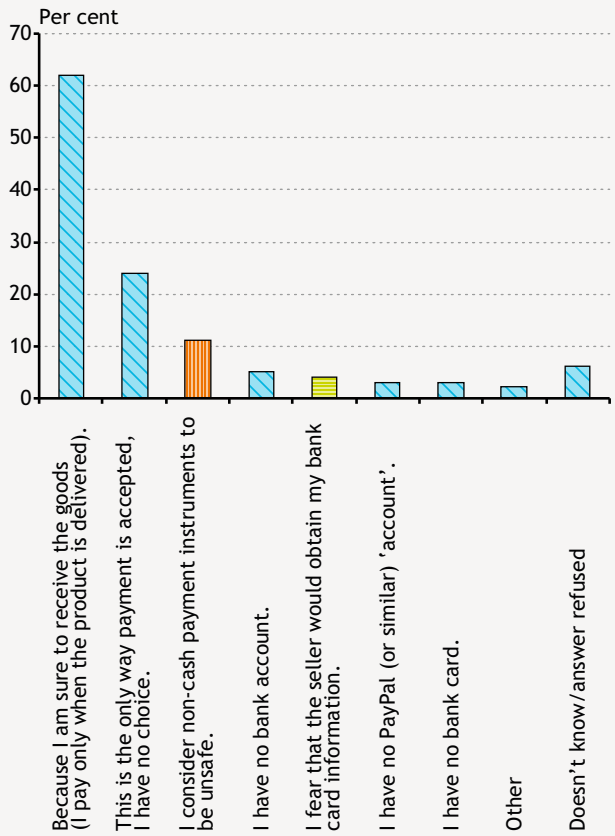
[4] Unemployed, housewife, child care benefit recipient, pensioner or student.

Chart 11
Reasons for the non-use of internet banking



Source: MNB.

Chart 12
Reasons for reluctance to use electronic payment for internet purchases



Source: MNB.

arrangement where the couriers delivering the products had mobile POS devices that would facilitate bank card payment upon receipt of the goods. Among the reasons for reluctance to use electronic payment for internet purchases, the ratio of security concerns is 11 per cent. If we add the responses of those who fear that the vendor would obtain bank card information, the two considerations together make up only 15 per cent.

CONCLUSIONS

One of the main conclusions of the analysis is that the less intensive use of modern, electronic payment instruments is primarily not due to security concerns. The sense of security relating to payment instruments relates mostly to familiarity, and concerns about the security of payment instruments tend to arise from lack of information. That is, consumers consider the solutions they know and use to be safer while the lesser known and little used ones are perceived as less secure. Consequently, the use of cashless electronic payment instruments can be intensified primarily through the dissemination of relevant information, which will elevate the sense of security in consumers as well.

As to the payment related knowledge of the population, there is room for improvement, which places considerable responsibility on the experts and institutions working in the area of payments. The survey highlighted that the majority of the population expects their own account keeping bank to convey information related to payment instruments.

Another conclusion of the survey is that personal example and the effect of opinion leaders encourages use. That is, if consumers use the various payment instruments, they have knowledge and practical experience about them and they exchange these with their peers, the use of such solutions will be more intensive.

The use of cashless electronic payment instruments can be intensified if we make people better informed, including information about security, and if their use is linked with some personal benefit.

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APPENDIX

SURVEY METHODOLOGY, DETAILS OF ALL THE RESPONSES TO THE QUESTIONS

- The survey was conducted by GfK Hungária Kft. on behalf of the Magyar Nemzeti Bank, using computer-assisted personal interviewing (CAPI) in the framework of the regular omnibus survey.
- Sample size: 1000 interviews.
- The sample is representative of the Hungarian population aged 15–69 in terms of gender, age, type of settlement and region.
- The interviews were conducted between 16 and 25 April 2012.
- The focus group interviews were conducted on 26 March 2012 in two target groups of 8 persons each (aged 25–45 and 45–59, respectively).

Which of the following payment instruments have you heard of, and how acquainted are you with them?
(n = 1000, multiple answers allowed)

	Unaided recall	Knows this payment method very well	Has some knowledge of this payment method	Has heard the name of this payment method	Never heard of it
Cash	97%	3%	0%	0%	0%
Bank card	70%	8%	10%	12%	1%
Yellow cheque	60%	30%	7%	3%	0%
Online credit transfer	20%	6%	13%	48%	13%
Core direct debit	18%	14%	19%	37%	12%
Online purchase with cash payment (e.g. cash on delivery, postal payment)	7%	10%	20%	49%	14%
Online purchase with electronic payment	7%	6%	15%	51%	21%
Paper based credit transfer	7%	6%	15%	40%	31%
Fund transfer by telebank	3%	2%	11%	52%	32%
Mobile transfer from bank account	3%	2%	10%	51%	34%
Mobile payment from the pre-paid balance or settled on the phone bill	2%	3%	11%	50%	33%
Electronic bill presentment and payment	1%	4%	9%	41%	45%

Which of the following online payment instruments have you heard of, and how acquainted are you with them?
(n=1000, multiple answers allowed)

	Unaided recall	Knows this payment method very well	Has some knowledge of this payment method	Has heard the name of this payment method	Never heard of it
Cash (cash on delivery)	69%	8%	8%	12%	3%
Bank credit transfer	57%	5%	11%	22%	5%
Bank card	47%	9%	11%	26%	8%
PayPal or Skrill (Moneybookers)	8%	0%	3%	16%	73%

How often do you use the following payment instruments or solutions in your day-to-day life? (n = 1000)

	Daily	More than three times a month	Up to three times a month	A few times a year	Does not use it at all	Never heard of it
Cash	72%	22%	2%	1%	2%	0%
Bank card	8%	31%	20%	8%	34%	1%
Yellow cheque	2%	42%	37%	6%	12%	0%
Core direct debit	1%	8%	18%	4%	58%	12%
Online credit transfer	0%	4%	6%	9%	67%	13%
Paper based credit transfer	0%	1%	4%	8%	56%	31%
Online purchase with cash payment (e.g. cash on delivery, postal payment)	0%	1%	3%	17%	64%	14%
Online purchase with electronic payment	0%	1%	2%	8%	68%	21%
Electronic bill presentment and payment	0%	1%	2%	2%	50%	45%
Mobile payment from the pre-paid balance or settled on the phone bill	0%	0%	1%	3%	63%	33%
Mobile transfer from bank account	0%	0%	1%	3%	62%	34%
Fund transfer by telebank	0%	0%	1%	2%	65%	32%

Which of the following devices or instruments do you have? (n = 1000)

	Yes	No
Mobile phone	89%	11%
Bank account	76%	24%
Bank card	72%	28%
Internet access (uses the Internet)	65%	35%

How often do you do banking through the following channels? (n = 760, those who have bank accounts)

	Daily	More than three times a month	Up to three times a month	A few times a year	Does not use it at all
Online ('Internet bank', 'e-bank')	1%	7%	11%	9%	72%
Personally in the bank	0%	4%	19%	64%	13%
Over the phone, with a bank clerk ('telebank', 'call centre')	0%	1%	5%	17%	77%
Mobile phone application on the mobile phone display ('mobile bank')	0%	1%	2%	5%	93%

For which of the following purposes do you use your bank card and how often? (n = 719, those who have a bank card)

	Daily	More than three times a month	Up to three times a month	A few times a year	Does not use it at all
Purchases in Hungary	8%	34%	22%	15%	22%
Online use	2%	4%	4%	11%	79%
Cash withdrawal from ATM in Hungary	0%	21%	64%	9%	5%
Cash deposit at ATM	0%	3%	5%	5%	87%
Contactless payment	0%	1%	1%	2%	96%
Purchases abroad	0%	1%	1%	9%	90%
Cash withdrawal abroad	0%	0%	0%	7%	92%

How do you use your bank card to withdraw cash? (n = 682, those who use their bank card for cash withdrawal)

I aim for free withdrawal, but I withdraw cash more often if I need it	43%
As often as withdrawal is free	30%
Frequently, I withdraw cash any time I need it	26%
DK/AR*	1%

** Unable or unwilling to answer (doesn't know/answer refused).*

How do you use your bank card to make purchases? (n = 576, those who use their bank card for purchases)

If I have enough cash on me, I prefer to pay cash		49%
I prefer to use a bank card if possible		34%
Up to a certain amount I prefer cash, for higher sums, bank card		16%
What is that amount?	Average: HUF 15,232 Median: HUF 10,000	
DK/AR		1%

How often do you use the following payment instruments for online purchases? (n = 241, those who purchase on the internet)

	Daily	More than three times a month	Up to three times a month	A few times a year	Does not use it at all
Cash (cash on delivery)	9%	9%	7%	58%	17%
Bank card	2%	14%	11%	20%	52%
Credit transfer	0%	8%	15%	31%	46%
PayPal or Skrill (Moneybookers)	0%	1%	2%	16%	80%

How often do you use mobile payment for the following purposes? (n = 40, those who use mobile payment)*

	Daily	More than three times a month	Up to three times a month	A few times a year	Does not use it at all
Purchase of other goods and services	2%	5%	4%	30%	59%
Highway toll, parking	0%	7%	4%	48%	40%
SMS voting (premium SMS service)	0%	0%	2%	21%	77%
Mobile phone related purchases (ring tone, logo)	0%	0%	0%	21%	79%

** Indicative information due to the small sample size.*

Why do you not have a bank account? (n = 246, those who have no bank account; multiple answers allowed)

I have no need for it because I cannot save.	39%
I receive my income and benefits in cash, so I get by without a bank account.	24%
I dislike banks.	17%
My money is no one else's business.	16%
Cash is accepted everywhere.	13%
It's too expensive to maintain a bank account.	12%
Cash is 'free'.	10%
Too complicated.	7%
Unsafe.	6%
I would not know how much money exactly I have.	0%
DK/AR	2%

Why don't you use your bank card for purchases? (n = 143, those who do not use their bank cards for making purchases, multiple answers allowed)

I consider it unsafe.	32%
I do not have enough money on it.	22%
Payment with a card is too slow.	19%
I do not know how much money I can spend.	14%
It's complicated to use, I don't know how to use it.	11%
I cannot remember so many codes/identifiers.	3%
I did not know that you could pay with it.	0%
Other*	11%
DK/AR	9%

** Typically: I prefer cash.*

Why don't you use the telebank (call centre) to manage your account? (n = 580, those who do not use telebank, multiple answers allowed)

I prefer to deal with the bank in person.	39%
I do not like making phone calls.	24%
I don't know how.	17%
It's complicated.	16%
I prefer internet banking.	13%
I consider it unsafe.	9%
I have no need for it.	3%
I tried it, but I had bad experiences.	2%
I cannot remember my password and various ID codes.	2%
I don't have a telephone.	1%
I prefer mobile banking.	1%
Other	2%
DK/AR	5%

Why don't you use the internet bank (e-bank) to manage your account? (n = 330, those who use the internet but not the internet bank, multiple answers allowed)

I prefer to deal with the bank in person because at the bank I get a piece of paper about the transaction I initiated.	32%
I prefer to deal with the bank in person because I can discuss my banking questions with the clerk.	27%
I consider it unsafe.	15%
It's complicated.	11%
I don't know how to use it.	10%
I'm afraid that unauthorised persons would gain access to my bank account.	10%
I have no need for it.	4%
I cannot remember my password and various ID codes.	3%
I tried it, but I had bad experiences.	1%
Other	1%
DK/AR	7%

Why don't you use the mobile bank to manage your account? (n = 656, those who do not use mobile banking, multiple answers allowed)

I prefer to deal with the bank in person.	39%
I consider it unsafe.	24%
I prefer internet banking (e-banking).	17%
I don't know how.	16%
It's complicated.	13%
The telephone display is too small.	4%
I have no need for it.	2%
I tried it, but I had bad experiences.	1%
Other	2%
DK/AR	4%

Why do you pay in cash when making purchases through the internet? (n = 199, those who pay cash for online purchases, multiple answers allowed)

Because I am sure to receive the goods (I pay only when the product is delivered).	62%
This is the only way payment is accepted, I have no choice.	24%
I consider non-cash payment instruments to be unsafe.	11%
I have no bank account.	5%
I fear that the seller would obtain my bank card information.	4%
I have no PayPal (or similar) 'account'.	3%
I have no bank card.	3%
Other	2%
DK/AR	6%

Why don't you use core direct debit for payment? (n = 579, those who have heard of core direct debit but are not using it, multiple answers allowed)

I use the yellow cheque to pay whenever I want.	50%
I do not see the invoice in advance, so I cannot verify the amount.	20%
I'm afraid that the payee (company) will debit my account by more than they are owed.	12%
I do not want them to have access to my bank account.	9%
I am not the one responsible for these things.	6%
I do not know the details of this payment solution.	5%
I have no bank account.	4%
I receive yellow cheques, but I make the transfer through the internet rather than paying in the post office.	3%
I have given a mandate for core direct debit, but eventually my account was not debited, I did not investigate why.	1%
I receive bills electronically and pay using one of the options offered there.	0%
Other	3%
DK/AR	7%

For core direct debits, do you set a limit above which you bank refuses the direct debit? (n = 298, those who use core direct debit)

Yes	42%
No	51%
DK/AR	7%

Do you know that the settlement of core direct debit can be blocked? (n = 1000)

Yes	36%
No	64%

By which date can you block the payment if you see from the bill that the payee wants to debit more than the legitimate amount?
(n = 360, those who know about the possibility of blocking)

By the end of the day preceding settlement	42%
Other	5%
DK/AR	53%

What is the maximum amount that you consider it safe...
(n = 1000)

	Average (among those who stated a sum)	Median (among those who stated a sum)	Any amount	DK/AR	No amount (HUF 0)	Average (among those who stated a sum other than 0)	Median (among those who stated a sum other than 0)
...to use a bank card for purchases?	HUF 39,171	HUF 20,000	45%	29%	3%	HUF 44,649	HUF 20,000
...to pay through paper based credit transfer?	HUF 41,163	HUF 10,000	40%	46%	5%	HUF 66,608	HUF 20,000
...to use a bank card for cash withdrawal?	HUF 55,452	HUF 50,000	32%	24%	2%	HUF 57,785	HUF 50,000
...to use core direct debit for payment?	HUF 27,640	HUF 15,000	31%	45%	7%	HUF 40,231	HUF 20,000
...to transfer funds though an internet bank?	HUF 21,337	HUF 0	29%	51%	10%	HUF 43,333	HUF 20,000
...to carry cash on you?	HUF 16,199	HUF 10,000	18%	14%	1%	HUF 16,474	HUF 10,000
...to use bank cards for online purchases?	HUF 12,607	HUF 0	18%	54%	15%	HUF 27,905	HUF 12,500
...to pay online for products or services purchased through the internet?	HUF 17,238	HUF 1,000	17%	52%	15%	HUF 33,247	HUF 10,000
...to pay using a mobile phone?	HUF 3,820	HUF 0	11%	62%	14%	HUF 8,095	HUF 5,000

How secure do you consider the following payment instruments or solutions?
(n = 1000)

	Average (on a scale of 5)	Very safe (5)	Fairly safe (4)	Medium safe (3)	Rather unsafe (2)	Very unsafe (1)	DK/AR	Never heard of the payment method
Yellow cheque	4.46	56%	34%	6%	1%	1%	2%	0%
Cash	4.35	52%	33%	12%	1%	1%	2%	0%
Bank card	3.85	24%	40%	21%	4%	3%	7%	1%
Paper based credit transfer	3.63	15%	22%	12%	5%	5%	10%	31%
Core direct debit	3.46	15%	25%	23%	6%	7%	12%	12%
Online credit transfer	3.01	9%	19%	21%	12%	12%	15%	13%
Mobile transfer from bank account	2.64	2%	10%	19%	11%	11%	14%	34%
Fund transfer by telebank	2.63	2%	11%	18%	14%	11%	13%	32%

How secure do you consider the following bank card based payment instruments or solutions? (n = 1000)

	Average (on a scale of 5)	Very safe (5)	Fairly safe (4)	Medium safe (3)	Rather unsafe (2)	Very unsafe (1)	DK/AR	Never heard of payment with bank card
Cash withdrawal from ATM	3.78	19%	42%	24%	3%	3%	8%	1%
Purchases in Hungary (POS terminal)	3.50	15%	30%	22%	6%	7%	19%	1%
Purchases abroad	3.50	15%	30%	22%	6%	7%	19%	1%
Cash deposit at ATM	2.96	8%	18%	22%	11%	13%	27%	1%
Cash withdrawal abroad	2.71	6%	15%	20%	14%	17%	28%	1%
Online use	2.71	5%	16%	23%	16%	16%	23%	1%
Contactless payment	2.54	4%	10%	14%	12%	16%	43%	1%

How secure do you consider the following online payment instruments or solutions? (n=1000)

	Average (on a scale of 5)	Very safe (5)	Fairly safe (4)	Medium safe (3)	Rather unsafe (2)	Very unsafe (1)	DK/AR	Never heard of the payment method
Cash (cash on delivery)	4.18	36%	41%	14%	1%	1%	3%	3%
Credit transfer	3.89	23%	41%	18%	3%	3%	7%	5%
Bank card	3.86	20%	41%	20%	3%	2%	5%	8%
Paypal or Skrill (Moneybookers)	3.18	2%	5%	6%	2%	2%	10%	73%

Have you or a personal familiarity of yours suffered a financial loss while using the following payment instruments? Have you heard that anyone has suffered a financial loss... (n = 1000)

	Yes, I have suffered a loss	Yes, an acquaintance has suffered a loss	I have heard of this, but know of no specific incidents	No	Never heard of the payment method
...using cash?	3%	5%	19%	73%	0%
...using bank cards?	1%	5%	29%	65%	1%
...using core direct debit?	1%	4%	16%	67%	12%
...using online credit transfer?	0%	3%	18%	66%	13%
...using electronic payment for online purchases through the internet?	0%	2%	17%	60%	21%
...using cash payment for online purchases through the internet? (e.g. cash on delivery, postal payment)	0%	2%	15%	68%	14%
...using yellow cheques?	0%	2%	13%	84%	0%
...using mobile banking, when payment is made from the pre-paid balance or settled on the phone bill?	0%	1%	12%	53%	33%
...using telephone credit transfer?	0%	1%	11%	56%	32%
...using mobile banking to the debit of a bank account?	0%	1%	11%	54%	34%
...using paper based credit transfer on a printed form?	0%	0%	8%	60%	31%
...using electronic bill presentment and payment?	0%	0%	8%	46%	45%

What would you consider to be a safe, reassuring confirmation in the course of the following online activities?
(n = 314, those who use the internet for banking or purchases)

	SMS	E-mail	Phone call	Internet code, password	DK/AR
When using internet banking	56%	7%	5%	25%	7%
When making online purchases	53%	8%	8%	22%	9%

What is your most important expectation from the selected payment method when you next encounter a purchasing/payment situation and you choose between payment alternatives?
(n = 1000)

	Speed	Convenience	Security (no possibility of fraud)	Reclaimability	Low cost (of payment)
For low-value purchases or payments (up to HUF 1000)	44%	14%	27%	5%	11%
For medium-value purchases or payments (up to HUF 10,000)	25%	20%	42%	5%	8%
For high-value purchases or payments (over HUF 10,000)	13%	12%	60%	7%	8%
For settling utility bills	13%	14%	52%	10%	12%

When making online payments or using internet banking, what measures do you take for the safety of your computer and data?
(n = 314, those who use internet banking or online purchases, multiple answers allowed)

Uses security software (e.g. firewall, antivirus software, etc.).	53%
Do not use computers in public places (e.g. internet cafés) for such purposes.	45%
None	14%
Other	1%
DK/AR	8%

What do you watch out for when using ATMs?
(n = 687, those who use their cards in ATMs, multiple answers allowed)

The safety of the neighbourhood	57%
Persons nearby	43%
Only uses it in the daytime	35%
Condition of the ATM	25%
Only uses it in a bank (within the building)	22%
Never uses it in busy locations	10%
None of these	8%
Never uses it in the street, outdoors	6%
DK/AR	1%

From among bank cards, which solution do you consider to be safer?
(n = 719, those who have bank cards)

Chip cards are safer.	33%
Magnetic stripe cards are safer.	8%
Both are equally safe.	35%
DK/AR	24%

When using bank cards for payment, which solution do you consider to be safer?
(n = 719, those who have bank cards)

The PIN is safer.	48%
Signature is safer.	10%
Both are equally safe.	28%
DK/AR	14%

If you must enter a PIN when making a purchase, what do you watch out for?
(n = 719, those who have bank cards)

I try to conceal my hand so that it is not visible.	70%
I would try to conceal it, but it is impossible.	11%
I ask the cashier to look away.	1%
Nothing	13%
Other	2%
DK/AR	3%

As far as you know, to whom can you disclose the PIN of your bank card?
(n = 719, those who have bank cards, multiple answers allowed)

No one	58%
Family members	36%
The bank	4%
The police or other official bodies	2%
Friends, acquaintances	1%
DK/AR	3%

As far as you know, to whom can you give your bank card when making purchases?
(n = 719, those who have bank cards, multiple answers allowed)

Any cashier, but only if you can clearly see all the time what s/he is doing with the card.	57%
No one	34%
Any cashier without any restriction	9%
DK/AR	1%

As far as you know, to whom can you give you bank card for their use?
(n = 719, those who have bank cards, multiple answers allowed)

No one	59%
Family members	40%
Friends, acquaintances	1%
DK/AR	1%

Do you know the purpose of the three-digit code at the back of every bank card, next to the signature field?
(n = 1000)

Yes, it is used for online payment with bank cards.	17%
Yes, other.	1%
No	82%

If you suffer a loss due to bank card fraud or if your card is lost or stolen, who do (would) you contact first?
(n = 719, those who have bank cards)

The bank	90%
The police	10%
The Hungarian Financial Supervisory Authority	0%
No one	0%

If you suffer a loss due to bank card fraud or if your card is lost or stolen, how soon would you report it?
(n = 719, those who have bank cards)

As soon as possible	96%
The same day	4%
When I have time	0%
Never	0%

If you suffer a loss due to bank card fraud (assuming that it is not your fault), how do you think is the loss divided between the cardholder and the bank?
(n = 719, those who have bank cards)

The entire loss is borne by the cardholder (client).	22%
The loss is borne by the cardholder (client) up to a certain amount, the remaining part by the bank.	10%
The loss is borne by the bank up to a certain amount, the remaining part by the cardholder (client).	8%
The entire loss is borne by the bank.	34%
DK/AR	26%

The loss is borne by the cardholder (client) up to a certain amount, the remaining part by the bank: Can you specify the amount above which the bank bears the loss?
(n = 74, those who have bank cards and know that the loss is borne by the cardholder [client] up to a certain amount, the remaining part by the bank)

HUF 45,000	0%
Other *(median: HUF 30,000, average: HUF 130,731)*	100%

Who would you like to inform you about the safe use of various payment instruments?
(n = 1000, multiple answers allowed)

My own account keeping bank	76%
Acquaintances, friends, family members	13%
Hungarian Financial Supervisory Authority	4%
Other banks, financial enterprises	3%
Magyar Nemzeti Bank	3%
The police	3%
IT companies	2%
Other	1%
DK/AR	14%

Dániel Felcser and Kristóf Lehmann: The Fed's inflation target and the background of its announcement

In the first stage of the crisis, the Federal Reserve (Fed) rapidly embarked on interest rate cuts followed by several rounds of substantial quantitative easing. However, the marked monetary easing and the persistently low interest rates triggered mounting fears of inflation, calling into question the Fed's commitment to medium-term price stability. In response to criticism and to the risks relating to monetary policy, in January 2012 the Fed announced an explicit inflation target of 2 per cent to exploit the fact that a numerical inflation target improves the transparency of the central bank, helps to anchor inflation expectations and fosters consensus about the definition of price stability among policymakers. With this move, the Fed added key elements of inflation targeting to its monetary strategy. The announcement confirmed that inflation targeting is becoming increasingly popular and may be an attractive and efficient monetary strategy, even for the largest central banks.

THE FED'S JANUARY ANNOUNCEMENT

During the global financial crisis, the Federal Reserve (Fed) in charge of U.S. monetary policy soon reduced the federal funds rate to practically zero; consequently, it could only employ non-conventional instruments[1] for the monetary easing required to achieve its statutory objectives. Before 2012, the Fed had announced two major asset purchase programmes (in March 2009 and November 2010), followed by the extension of the maturities of the government securities portfolio on its balance sheet starting in September 2011 ('Operation Twist'). Within the framework of the latter, long-term government bonds were bought and short-term bonds sold, and thus the average maturity increased without any major change in the balance sheet of the central bank. This measure contributed to lowering longer-term interest rates. Furthermore, in August 2011 forward guidance was added to their statement to the effect that economic conditions warranted 'exceptionally low rates' at least through mid-2013, instead of the earlier 'extended period'. Setting a longer horizon than previously anticipated may have also helped to lower long-term interest rates (Bernanke, 2012). In January 2012, the time horizon was extended even further, until late 2014.

To supplement these measures, simultaneously with the interest rate decision in January 2012, the Federal Open Market Committee (FOMC) announced two new monetary policy tools: a 2 per cent inflation target as measured by the annual change in the personal consumption expenditures price index, and the publication of the policymakers' conditional forecasts for policy rates. These measures came as no surprise to market participants, as the central bank's communication had previously indicated such intentions. The minutes of meetings reveal that the two strategic steps were already considered in the autumn, following which the staff presented the proposals and a subcommittee devised the specific form of the measures. As the end result, the rate projections were integrated into the other variables of the forecast, while a separate announcement was published on the longer-term goals of the central bank.

The published announcement confirmed that the Fed continues to consider as its primary objective the fulfilment of its dual mandate, that is, price stability as well as maximum employment. On the other hand, it was also emphasised that the communication of a numerical inflation target may help keep longer-term inflation expectations firmly anchored, thereby fostering price stability and moderate long-term interest rates and enhancing the effectiveness of measures to promote maximum employment. Unlike inflation, the labour market is influenced by a number of factors over which monetary policy has no control (e.g. demographics, labour market

[1] When using non-conventional tools, the central bank strives to achieve its objectives through the use of mechanisms other than the traditional adjustment of the base rate (direct credit market intervention, for instance through high-volume asset purchases or government bond purchases). For more details, see Lehmann (2012).

regulation, minimum wages, qualifications). Consequently, it is not appropriate to specify a target value for employment alongside the inflation target. Nevertheless, the Fed takes into account the labour market situation when making its rate decisions. It was also emphasised that the two objectives – price stability and maximum employment – are generally not contradictory for policymakers; indeed, the measures adopted to maintain price stability tend also to improve employment. When this is not the case, the Fed follows a balanced approach in fulfilling its mandate, taking into account the magnitude and nature of shocks, the condition of the economy, deviations from the inflation target and the employment level consistent with its mandate as well as the time horizons over which employment and inflation are projected to return to levels judged consistent with its dual mandate.[2]

These measures fit into the series of steps taken by the Fed to enhance the transparency of its own operation: statements have disclosed votes by name since 2002, the minutes have been released before the next meeting since 2005 and press conferences have been held after rate decisions since 2011. Still, the assessment of the Fed's new strategic elements is not unequivocal. Some believe that by setting an inflation target, the Fed has introduced a so-called flexible inflation targeting regime (Anderson, 2012; Bullard, 2012; Carney, 2012), while others still do not consider the Fed to be an inflation targeter (Thornton, 2012). In the following, we assess the January 2012 announcements of the Fed in light of the economic debates on monetary policy and the statutory mandate.

BENEFITS OF THE NOMINAL ANCHOR AND THE PRACTICE OF INFLATION TARGETING

One factor behind the changes to the Fed's strategy could have been the numerous benefits offered by an explicit inflation target. Perhaps the most important of these is it helps monetary policy to better anchor inflation expectations, which plays a key role in maintaining price stability. In the absence of a nominal anchor, historic data and anecdotal evidence may divert inflation expectations more easily as the goal of the central bank is unclear. The statement of the FOMC also emphasised the efficiency of the explicit target in anchoring inflation expectations. The announcement also had the objective of increasing the transparency and effectiveness of monetary policy (Bernanke, 2012). For the announcement, the decision-making body of the central bank must reach a consensus on the level of the nominal anchor. This consensus provides for a more coherent decision-making process, more effective price stability related communication and the enhanced accountability of monetary policy. Finally, in the event of more easing to stimulate the real economy, there is less risk of rising inflation expectations, which may also be an important consideration in the present situation.

The effectiveness of the explicit target is shown by the rapid international spread of inflation targeting and its success as a strategy. Inflation targeting (IT) is a monetary policy strategy where the central bank strives to achieve its primary objective of price stability through a publicly announced inflation target. Inflation targeting was first introduced in New Zealand in December 1989. In the subsequent two decades, a number of other countries followed suit and now this strategy is employed by the central banks of 27 countries at different levels of economic development throughout the world (on the main features of the regime, see MNB, 2012). Experience shows that the regime has been successful in curbing inflation (e.g. Roger, 2010), and consequently, no central bank has abandoned the IT strategy so far, with the exception of some euro-area members as they introduced the common currency. Based on the current international best practice, inflation targeting central banks (IT central banks) operate in a so-called flexible inflation targeting framework. Under this regime, in addition to its primary goal of maintaining price stability, the central bank attempts to reduce economic volatility which arises from other sources and reduces social welfare (see Carney, 2012; Svensson, 2009). Inflation targeting has typically been a regime for small, open economies, but in addition to the IT central banks of a number developing and developed countries, the strategies of several central banks with global significance, such as the Fed and the European Central Bank (ECB) also contain elements of IT. Furthermore, in 2012 the Fed and the Bank of Japan took another step towards an IT regime by announcing explicit inflation targets. (See Box 1 on the measures of the Bank of Japan.) The announcements indicate that a shift towards IT offers an attractive monetary policy framework to major central banks as well.

[2] Unlike demand shocks, supply shocks affect inflation and output in opposite directions; therefore the central bank is faced with a trade-off between stabilising inflation or output. For instance, in oil importing countries a rise in oil prices is soon reflected in consumer prices through increasing petrol prices, and the higher transportation costs may in the longer run trigger price increases in a wider scope of products. Increased production costs prompt businesses to reduce their output, which in turn slows GDP growth. Relative stabilisation of consumer prices would result in additional output losses in the short term and add to the volatility of the real economy, while in the absence of a central bank response the entire effect of the shock would be reflected in prices and built into the pricing decisions of economic agents. Thus in this case both objectives need to be compromised and the partial stabilisation of both prices and output may be the appropriate decision.

The Fed conducts monetary policy in a framework other than IT, based on its so-called dual mandate. The 1977 amendment of the Federal Reserve Act set three goals for the Fed: maximum employment, price stability and moderate long-term interest rates. This was the first time that the maintenance of price stability was added to the tasks of the Fed, reflecting the changing economic thinking in the wake of the double-digit inflation of the 1970s. As the Fed can moderate long-term interest rates mostly by keeping inflation low, which reduces the inflation premium required by investors from long-term assets, the goals of the Fed are generally referred to as the dual mandate. This name reflects the idea that price stability and maximum employment have the same weight and the goal of price stability does not play a primary role. This, however, does not preclude the setting of an explicit inflation target.

The simultaneous achievement of price stability and the employment goal means that the Fed must strive to keep unemployment close to its natural rate. In other words, maximum employment does not mean zero unemployment, but rather a sustainable level of employment that does not result in inflationary pressure, or to put it differently: where unemployment is at its natural rate (Meyer, 2004). The differentiation between the two employment concepts was reinforced by the Humphrey-Hawkins Act of 1978, which clarified the amendment of the Federal Reserve Act in the previous year. Furthermore, while the Fed may have only a minimum effect on the long-term unemployment rate, it may be able to smooth short-term economic fluctuations (Judd and Rudebusch, 1999). Thus, it is more appropriate to interpret the goal of maximum employment as the stabilisation of output. In this interpretation, under its dual mandate the Fed strives simultaneously to reduce the volatility of inflation and of the real economy – similarly to a number of other central banks.

In its practical, flexible form, IT also includes the mitigation of both types of volatility. Central banks are aware that excessive volatility in the real economy must also be avoided, balancing between considerations of inflation and the real economy. The economy may be subject to a number of shocks that may divert inflation from the designated inflation target. Below a certain – typically medium-term – projection horizon, IT central banks strive to bring inflation back to a level consistent with price stability. The length of the horizon may depend on the size and nature of economic shocks. Assuming a credible monetary policy, the central bank may disregard the effect of temporary shocks, and by stabilising inflation in the medium term it may avoid causing excessive real economic volatility in the economy and the money markets. For instance, when the economy suffers a supply shock (e.g. an increase in oil prices) and inflation could be brought back to the target only at additional costs to the real economy, the central bank does not attempt to fully offset the shock, but rather only tries to moderate second-round effects. Indeed, in case of a flexible IT real economic swings may be dampened more effectively because due to the anchoring of inflation expectations, a temporary departure from the inflation target has no major effect on longer-term inflation. This, however, requires a credible nominal anchor.

Flexible IT does not limit the room for manoeuvre of central banks as compared to the dual mandate, as it also takes into account considerations of the real economy when conducting monetary policy. Empirical research shows that inflation targeting central banks have been able to curb inflation with lower economic volatility than the central banks of countries at similar levels of development which adopted different monetary regimes (Levin et al., 2004; Roger, 2010). Thus, the stabilisation of inflation at a low level does not need to be accompanied by greater economic volatility. Indeed, results indicate the opposite: by anchoring expectations, central banks can be more effective in smoothing economic swings as well.

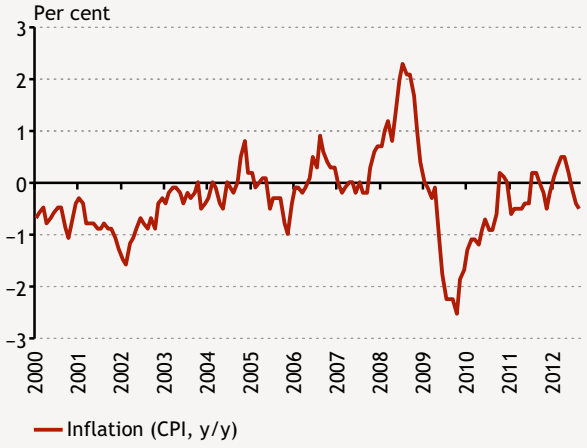
Box 1
The inflation goal of the Bank of Japan

The Bank of Japan (BoJ) is one of the central banks of a developed country that conducts monetary policy in a regime other than inflation targeting. In February 2012, however, practically simultaneously with the Fed, they introduced an important IT element, setting an explicit inflation goal temporarily at the 1 per cent level while establishing a medium- and long-term goal of 2 per cent or less. The announcement intentionally avoided the use of the term 'target', which is associated with inflation targeting, using 'goal' instead to show a lesser degree of commitment than under the inflation targeting regime, with no target date announced.

In the past fifteen years, the Japanese economy has faced severe growth problems due to the extended deleveraging process. Economic policy has moved towards flexible wage adaptation to moderate the decline in employment. In response to falling wages, intense

competition among businesses and growing imports, enterprises changed their pricing strategy and deflation (falling general price level) followed. Intense competition prompted cost cutting by businesses, which in turn drove up unemployment and even though consumption expanded, deflation remained (Chart 1).

Chart 1
Consumer price index in Japan



Source: OECD.

Persistent deflation was linked to expectations of weak economic growth. In the course of the deleveraging which started in the 1990s, economic stimulation was ineffective despite continuous monetary easing. The BoJ announced that the zero interest rate policy introduced in 1999 would be maintained as long as deflationary expectations prevailed. However, monetary easing proved to be ineffective. On the contrary, the dotcom crisis followed by fears of global recession starting in 2001 only reinforced expectations of low economic activity and falling price levels in Japan. As traditional monetary policy instruments had already reached their limits, the BoJ resorted to quantitative easing between 2001 and 2006 to stimulate growth and lending. During those six years the stimulation of the economy produced no appreciable results and deflationary expectations stabilised. Given the renewed growth problems during the global financial crisis, continued monetary easing was unable to persistently prevent the decline of price levels.

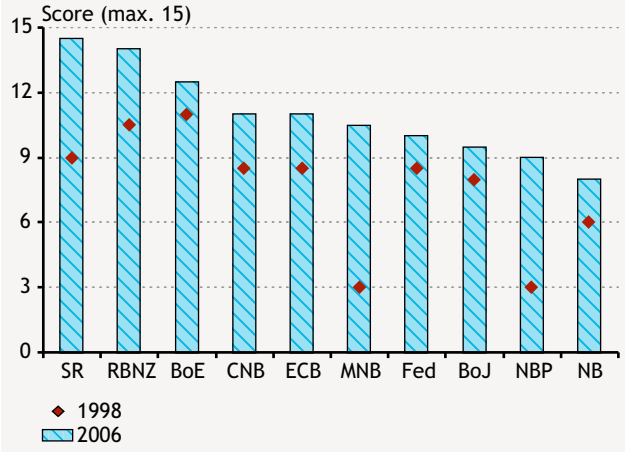
It may have been due to the ineffectiveness of the zero base rate and the non-conventional measures that the BoJ took a step towards inflation targeting. The Governor of the Japanese central bank, Masaaki Shirakawa, hinted that the BoJ was trying to publicly clarify general monetary policy principles (Shirakawa, 2012). Previously, policymakers had separately specified their own views on the percentage consumer price index that was consistent with price stability. The statements and announcements of the central bank in previous years showed an understanding of price stability similar to the goals now announced. Thus, the present announcement did not represent a substantive change, but the collectively announced inflation goal may help anchor expectations. Shirakawa emphasised that the primary responsibility of the central bank was to overcome deflation, and then to achieve sustainable growth with price stability (1 per cent inflation). The decade-long period of deflation may be the reason that the short-term objective was identified as 1 per cent, along with the medium- to long-term goal of 2 per cent or less.

The announcement of the BoJ represented a step towards IT, but without the other instruments of IT (great degree of transparency, inflation reports, priority of the inflation goal) it is no more than that, while no serious commitment to achieving the inflation goal has been made. At the zero lower bound, the BoJ is unable to rely on interest rate policy while the experience of two lengthy periods show that quantitative easing has been unable to shift the economy towards a 1 per cent rate of inflation, and thus the only remaining tool was communication and the adjustment of the set of objectives. Within this, the indication for the expected interest rate is also linked to inflation, unlike in the case of Fed, for instance, which gives a specific period, currently lasting until mid-2015. At the press conference where the inflation goal was introduced, the expansion of the asset purchase programme was also announced. The dual announcement was meant to curb deflationary expectations. According to Shirakawa, in the wake of the crisis central banks have tried to improve their monetary regimes, learning from each other's lessons important elements such as the explicit inflation target. This happens by a convergence in the operation of central banks, which blurs past differences to some extent.

FED'S CONVERGENCE TO INFLATION TARGETING

Before the financial crisis, the performance of the Fed was viewed with general satisfaction. Its achievements in curbing inflation and anchoring expectations contributed to the credibility of monetary policy. The employment mandate of the central bank may allow economic policymakers to use it as an excuse to prioritise the short-term political benefits of low unemployment over the longer-term economic costs of higher inflation – but the good inflation results of the Fed did not hint at any substantial political pressure (Labonte, 2012). Furthermore, in respect of transparency, the Fed was by and large in line with other major central banks (ECB, Bank of Japan) and the inflation targeting central banks of developed countries in the 1990s, and more progress

Chart 2
Central bank transparency



Note: The abbreviations for central banks: SR: Sveriges Riksbank, RBNZ: Reserve Bank of New Zealand, BoE: Bank of England, CNB: Czech National Bank, ECB: European Central Bank, MNB: Magyar Nemzeti Bank, Fed: Federal Reserve, BoJ: Bank of Japan, NBP: National Bank of Poland, NB: Norges Bank.
Source: Dincer and Eichengreen (2010).

followed in the 2000s (Chart 2). In the 2000s, before the outbreak of the crisis (at the time of the so-called 'Great Moderation'), dynamic growth was coupled with high employment and low inflation, and thus the main requirements from modern central banks and in particular the Fed were apparently satisfied.

Despite the good performance, there were intense economic debates as to whether a switch should be made to inflation targeting as an alternative to the dual mandate. Critics of the IT argued mainly that the new framework for achieving only the inflation target would limit the manoeuvring room of the Fed, and that the inflationary effects of shocks would need to be offset within a fixed horizon, which would reduce the flexibility of the Fed (Friedman, 2004; Meyer, 2004). Following this logic, the inflexibility of inflation targeting would lead to a greater volatility in the real economy because, for instance, in the event of a supply shock it would give preference to meeting the inflation target. In the discussions of the FOMC the members failed to reach a consensus on a number of items ranging from the target indices (headline consumer price index or core inflation) to the definition of the specific target value.

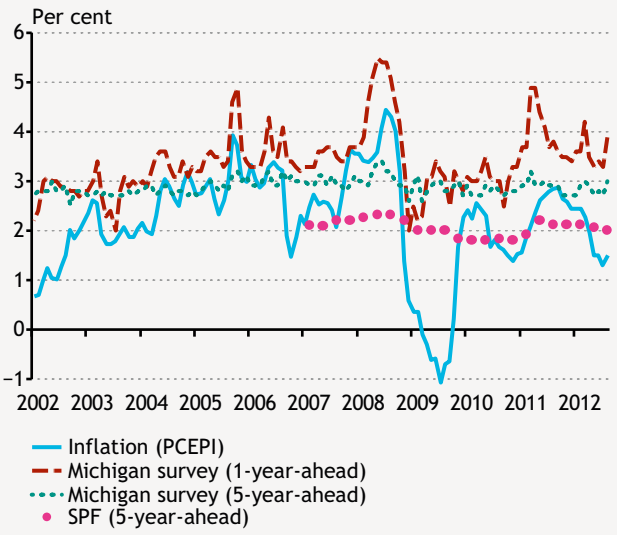
Proponents of IT emphasised that the monetary policy of the Fed was flexible, but the absence of clear long-term goals caused greater uncertainty, which could have been avoided if there were a nominal anchor. The performance of the Fed was also more difficult to assess while the benchmark was unknown. According to this rationale, despite the success of the dual mandate, IT would provide a clearer strategic framework for the Fed. The research of Bernanke et al. (1999) indicates that IT is the best available framework to keep inflation and expectations low in the long run in order to promote economic growth, while in the face of economic shocks it also permits temporary deviations from price stability. For instance, the optimal monetary policy takes into account the size and nature of shocks and flexibly moves the horizon accordingly. Despite the good assessment of the Fed's inflation performance, it was noted that compared with IT central banks, inflation expectations were less anchored in the case of the Fed because the long-term inflation expectations of the private sector responded more sensitively to economic news (Gürkaynak et al., 2010).

The practical working of IT, particularly during the crisis, also proved that the inflation target is not in conflict with growth. In response to worsening growth prospects, the central banks of developed countries lowered the base rate to near zero within a short time, followed by high-volume asset purchase programmes and other measures also aiming for quantitative easing. In this, they were supported by weak demand moderating price and wage developments as well as the credibility of monetary policy established by the low inflation of the preceding period and the anchored inflation expectations. Alongside IT banks, the Fed also played a pioneering role in devising monetary policy instruments to stimulate economic recovery.

In the course of the crisis concerns were raised, however, that due to the substantial quantitative easing and prolonged low interest rate levels, the Fed could face problems of inflation in the longer run. After the tensions on the subprime market and the Lehman bankruptcy, the Fed attempted to handle market frictions through aggressive monetary easing, in order to avoid a banking crisis. Even though the Fed initially justified this by the need to avert the risk of deflation, strong quantitative easing and pro-growth communication increased inflation fears, particularly in 2011, when inflation soared in the wake of the global commodity price shock, and 12-month inflation expectations increased considerably (Chart 3). Longer-term expectations were anchored; however, surveys showed that uncertainty increased after the onset of the crisis: while the central tendency remained stable, an increased percentage of respondents expected deflation or higher inflation (Pasaogullari and Bianco, 2010). All this may have been a warning sign for credibility concerning price stability, and over time it could have threatened longer-term expectations as well.

As a result of the strong fiscal easing and the consolidation of the financial sector, U.S. public debt rose sharply. Gross public debt increased by one-half in 4 years, exceeding 100

Chart 3
Inflation and inflation expectations in the U.S.



Source: Bureau of Economic Analysis, Michigan survey, Survey of Professional Forecasters (SPF).

per cent of GDP by end-2011. It came up for discussion that as most of the U.S. debt is fixed in nominal terms, high inflation would reduce the debt to be repaid in real terms, and thus the accumulated debt could be reduced through higher inflation (see for instance Aizenman and Marion, 2009). These ideas may also have strengthened expectations that the Fed would tolerate higher inflation in the future, which could have also prompted the Fed's policymakers to establish a more transparent strategic framework.

These problems revealed that the former implicit inflation target needed to be replaced by a strong nominal anchor. Economists now tend to think that in the Greenspan period (1987–2006) the Fed had an implicit inflation targeting regime that had no explicit, numerically expressed inflation target up till the end of January 2012 (Goodfriend, 2004).[3] Price stability was one of the goals all along and policymakers also made their commitment to this goal clear, while there was no consensus on the level of inflation the individual policymakers would consider consistent with the mandate of price stability; this could have been aggravated by the turnover in the members of the FOMC.[4] From early 2009, an indication of the implicit target could be found in the long-run inflation forecast of the members, which showed the value which the various policymakers thought inflation would converge to over the longer run, given an 'appropriate' monetary policy; based on this, the price stability mandate of the Fed was generally interpreted to mean a 2 per cent inflation target (Kocherlakota, 2010).[5] By making the inflation target a specific, explicit number, the Fed can offer a firmer nominal anchor to the U.S. economy without incurring any cost to economic growth.

The main aspects of the present strategic framework of the Fed are consistent with the international best practice of inflation targeting, while certain unique features can also be identified. The point target selected by the Fed is characteristic of most IT central banks. Some of them also identify a symmetric tolerance band around the target, but a target band diverts attention from the actual inflation path, providing less firm orientation for expectations. The level of the inflation target (2 per cent) is within the 2–3 per cent interval typical in developed countries and in line with the implicit target emerging from the earlier projections of the policymakers (Chart 4). By contrast, the indicator for the inflation target and the absence of a uniform inflation report differ from the established practice of IT regimes. While IT central banks tend to set their targets in terms of the Consumer Price Index (CPI), the Fed opted for the Personal Consumption Expenditures Price Index (PCEPI). The PCEPI takes into account changes in consumer habits and a broader range of products and services, such as expenditures of public health care programmes, but it is regularly revised over time.[6] The absence of a uniform inflation report is another difference compared to the practice of IT central banks, even though the regional Fed banks analyse the economic developments of their respective regions and the Federal Reserve Bank of New York also publishes detailed reports containing a staff projection. A regular, comprehensive publication used for the decisions of the FOMC could be conducive to the better

[3] Being an implicit IT central bank, the Fed influenced the policy rate the way an explicitly IT central bank would have done, that is, it responded to the deterioration of inflation prospects with a rate increase.

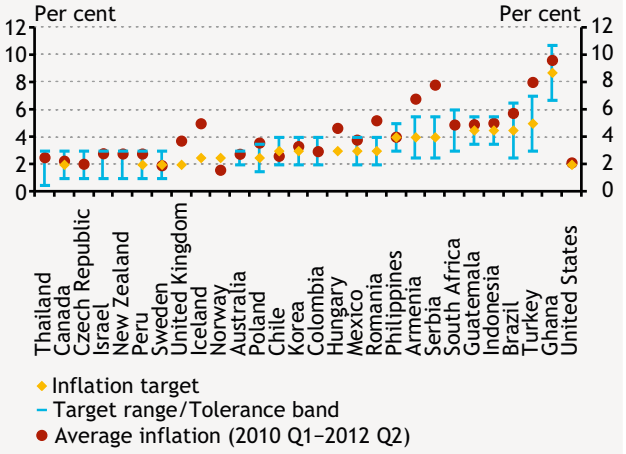
[4] The FOMC has 12 members: the 7 members of the Board of Governors, the President of the Federal Reserve Bank of New York and four of the remaining 11 regional Federal Reserve Bank presidents, who serve one-year terms on a rotating basis.

[5] In 2011, the central tendency, which excludes the three highest and the three lowest projections, outlined a 1.7–2.0 per cent long-term range for inflation, as measured by the price index for personal consumption expenditures.

[6] The two indices differ primarily in the statistical methodology of their calculation, the coverage of products and services consumed, the relative weighting of products and services (consumer or retail survey) and other statistical aspects (seasonal adjustment, imputed prices) (Clark, 1999). The variable basket of goods used for the PCEPI follows changes in purchasing patterns better, while the consumer price index is simpler and the measurement of prices is more reliable. The two indices typically move together, though significant differences may arise from time to time. This is partly explained by the fact that the PCEPI is better at capturing the substitution effect between products with rising prices and their substitutes through the changing consumption weights, and thus the price index may be lower than the CPI.

understanding of monetary policy (Bernanke et al., 1999; Plosser, 2012), but critics of the idea think that it would give greater relative weight to inflation developments, and thus it would be inconsistent with the 'spirit of the dual mandate' (Meyer, 2004). In the meantime, the projections of the members are published, the reasoning behind the decision is explained in a press conference and other communication channels are also used intensively to lay the foundations for the necessary openness. Furthermore, since early 2012 the projections for the federal funds rate have also been published. The published policy rate projections help with the interpretation of the forecasts and the overall macroeconomic path and facilitate an understanding of the thoughts and positions of the policymakers (for more details, see Box 2).

Chart 4
Inflation targets of IT central banks for 2012

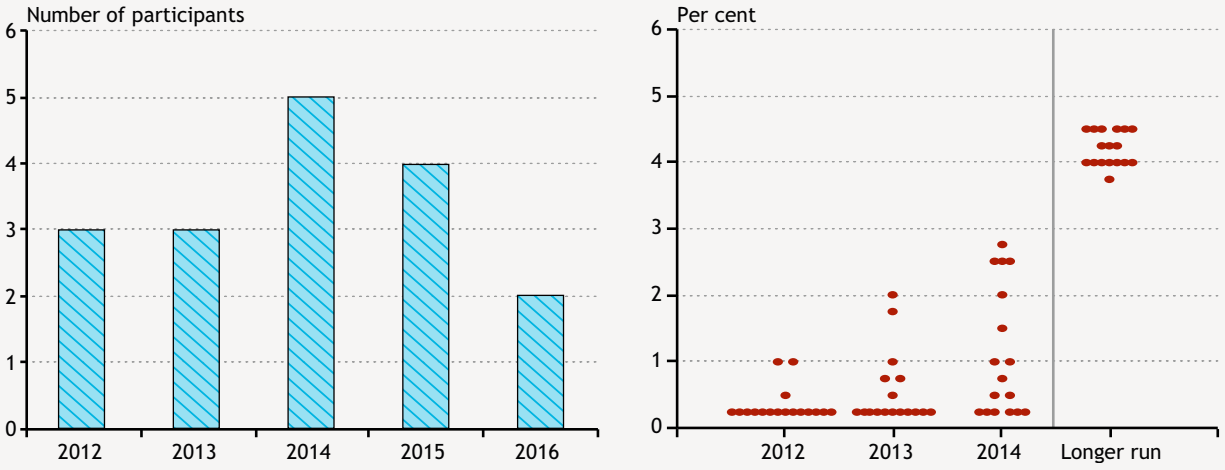


Note: The target is CPI everywhere except in the U.S. (PCEPI) and Thailand (core inflation). The Thai central bank has already proposed the introduction of a headline inflation target (3±1.5 per cent), but this has been postponed for the time being. The inflation figures are expressed in the indicator appropriate for the target. For Thailand, average inflation is the 12-month moving average.
Source: IFS; Bureau of Economic Analysis; Bank of Thailand; Hammond (2012).

Box 2
Forecasting the federal funds rate

In addition to announcing the inflation target, since early 2012 the federal funds rate projections of policymakers have also been made public. Thus, the federal funds rate was added to the forecasted variables, with the Fed joining the ranks of a few inflation targeting central banks (New Zealand, Norway, Sweden, Czech Republic). It should be noted that the federal funds rate projection is not a promise; instead, it shows the path projected based on the information available at the time. In addition, in the case of the Fed it is more of an assumption rather than a projection in the narrow sense. This is because it does not show the most likely path, but rather

Chart 5
Appropriate timing of policy firming and policy rate projections
(January 2012)



Source: Federal Reserve.

the interest rate that, in the opinion of the various policymakers, would facilitate the achievement of the desired economic (inflation, employment) outcome (Plosser, 2012). The publication of interest rate projections makes the conduct of monetary policy easier to understand and economic agents may have a clearer notion of future policy rates. In this respect, it is not the accuracy of the initial projections that matters but the fact that economic agents may observe the projections change over time and thus they can learn more about the Fed's reaction function (Evans, 2012). This may help households and businesses make more informed decisions, reduce economic and financial uncertainty (and thus long-term interest rates) and increase the efficiency and accountability of monetary policy.

However, conclusions concerning monetary policy should be drawn from the projections with caution because individual projections are taken into account when adopting a decision, but the main communication tool is the FOMC statement. The interest rate projection may clarify the forward guidance given in the statement, but there may also be conflicts between them. This is possible because projections are made not only by the current members of the FOMC, therefore they also reflect the personal assessments of non-voting members at the time. By contrast, the statement contains the views of the FOMC members.

The Fed does not publish the entire interest rate path just like in the case of the other projected variables, as opposed to the Swedish, Norwegian or Czech central banks. Instead, the projections are displayed in two charts. The first chart shows the expected year of the first increase in the policy rate (Chart 5, left panel). This reflects the guidance that the federal funds rate may remain extremely low until end-2014. The second chart shows the projections for the last quarter of the current year, for subsequent years and over the longer run (Chart 5, right panel). The chart also indicates that the 'particularly low interest rates' do not necessarily coincide with the current 0–0.25 per cent. The median is 0.75 per cent, thus the 0.25–0.75 per cent range may fall into the particularly low category.

With its January announcement the Fed took a major step towards inflation targeting. Nevertheless, in formal terms it is not an IT central bank because there is no commitment to the priority of price stability, as the employment objective is not subordinated to price stability (Table 1). According to a widely accepted classification, inflation targeting requires that the central bank has an explicit, numerical inflation target and a hierarchical set of objectives, that is, the inflation target has priority among mandates. With the announcement in January, the first criterion is now satisfied but the Fed still fails to meet the second one. The other elements of strategy, however, are all present in the operation of the Fed, and any further approximation may be hindered by political and legal obstacles. The strategy of IT could be legally introduced in the framework of the current mandate of the Fed, if it considers that this would be conducive to achieving its objectives more efficiently (Labonte, 2012; Plosser, 2011). In the present labour market environment, however, dropping or de-emphasising the employment mandate would be a politically difficult decision. Since the onset of the crisis, the U.S. labour market has still not recovered; in light of this, commitment to the priority of price stability would not necessarily coincide with the preferences of policymakers or households and it would be difficult to communicate against the backdrop of the current fragile economic recovery and loose labour market conditions. Nevertheless, we think that despite the tradition of the dual mandate the Fed has effectively committed itself to a monetary policy strategy corresponding to flexible IT.

In the past six months, soaring inflation expectations have been corrected and inflation has decreased. Though the elapsed time is too short for comprehensive analysis and for conclusions to be drawn, in 2011 Q4 and 2012 Q1–Q2 the U.S. economy produced dynamic annual growth of over 2 per cent on average, while disinflation continued despite the high energy prices early in the year. The (one-year)

Table 1
Is the Fed an inflation targeting central bank: assessment based on the criteria of Mishkin (2004)

Criterion	Satisfied
Announcement of medium-term numerical target for inflation	✓
Institutional commitment to price stability as the primary goal of monetary policy	×
Information inclusive monetary strategy	✓
Increased transparency of monetary policy towards the public and the markets	✓
Increased accountability of the central bank for the attainment of its inflation objectives	✓

inflation expectations subsided despite the growth prospects, favourable in international comparison, and the persistent high level of energy prices. All of this created appropriate conditions for the new asset purchase programme of the Fed announced in September 2012, whereby it will purchase USD 40 billion of mortgage-backed securities (MBS) a month. In addition to the new asset purchase programme, existing instruments (such as the aforementioned 'Operation Twist') have also been extended to the end of the year and the federal funds rate is projected to remain low until mid-2015, i.e. longer than previously envisaged. Based on the projection of the Fed, inflation will remain on target despite continued easing, growth will pick up, and by end-2014 unemployment may slowly fall to below 7 per cent. In our opinion, the new strategy elements announced in January may have contributed to the successful anchoring of inflation expectations and may continue to play an important role in the future.

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Dániel Holló: Identifying imbalances in the Hungarian banking system ('early warning' system)

The new Hungarian Central Bank Act passed at the end of 2011 delegated macroprudential regulatory powers to the MNB. The essential elements of an effective macro-prudential policy are analytical tools which make it possible to quantify the effects arriving via different systemic risk channels and regulatory instruments which can help in the management of systemic risks. Among the four analytical tools tuned to identify and measure systemic risk ('early warning' system, stress tests, contagion models and a system-wide financial stress indicator) two are already in regular use at the MNB (stress tests and the system-wide financial stress indicator), a contagion model is currently under development and the 'early warning' system is about to be introduced. This article presents one of the four tools discussed above: the 'early warning' system. The 'early warning' system may help in the identification of periods characterised by excessive credit growth and the accumulation of critical imbalances on the banking sector's assets and liabilities side as a result of excessive bank lending (excessive credit growth channel of systemic risk), and may serve as a point of reference for the timing of the introduction of measures named in the new MNB Act to reduce systemic risk (e.g. anti-cyclical capital buffer and other regulatory instruments designed to prevent excessive credit growth). Our results show that excessive imbalances on the asset and liability sides of the Hungarian banking system started to emerge in 2005 Q4; the current problems facing Hungarian banks stem from the large imbalances on the assets and liabilities side (excessive credit growth and significant increase in the share of non-core or secondary liabilities within total liabilities), which characterised the period between 2005 Q4 and 2008 Q4.

INTRODUCTION

The new MNB Act, passed at the end of 2011, which also includes tasks related to the identification and management of systemic risks,[1] makes the MNB the institution primarily responsible for the conduct of macroprudential policy in Hungary. The essential elements of an efficient macroprudential policy are the analytical tools which can help in the quantification of potential effects arising via the various channels of systemic risk and regulatory instruments which allow for the efficient management of these risks.

Based on the findings in international literature, three main channels of systemic risk can be identified at present: (i) sustained and excessive credit growth associated with significant asset price growth,[2] (ii) external and internal shocks affecting financial system participants simultaneously, and (iii) interbank and financial market contagion. Quantifying the effects arising through these channels and the proper quantitative assessment of systemic risk require the simultaneous use of a number of analytical tools. The following tools constitute the backbone of the family of models and indices serving the measurement of systemic risks.

1. 'Early warning' systems, which may facilitate the identification of periods characterised by excessive credit growth and the accumulation of critical imbalances on the banking sector's assets and liabilities side as a result of excessive bank lending.

2. Stress tests (for liquidity, market and credit risks), which may help in quantifying the impact of various real economic and financial risks on financial institutions'

[1] According to De Bandt and Hartmann (2000); De Bandt et al. (2009); ECB (2009) 'systemic risk can be defined as the risk that financial instability becomes so widespread that it impairs the functioning of a financial system to the point where economic growth and welfare suffer materially'.
[2] Alessi and Detken (2009).

solvency and liquidity position. Stress tests, however, can be used not only to measure the effects of distinct risk scenarios on banks' solvency and liquidity, but also to produce risk scenarios (showing combinations of real economic and financial risks which might endanger financial system stability).

3. Contagion models, which may help in quantifying the effects arising via various contagion channels in the interbank and financial markets. Furthermore, contagion models may also support the identification of systemically important financial market participants.

4. Indicators of financial stress, which measure the current level of stress in the financial system, i.e. help to assess how the financial system's risk level is changing as a result of the interaction of shocks and accumulated tensions and imbalances in the system. In addition, critical stress thresholds calibrated to the financial stress indices may help in deciding whether the level of risk observed in the financial system in a given period has reached an extent which would pose a threat to the entire system's stability.

However, conducting macroprudential policy requires more than just the existence of analytical tools serving to measure the effects arising through the distinct systemic risk channels; it also requires regulatory instruments designed to mitigate systemic risks. The macroprudential instruments enumerated in the MNB Act primarily serve to mitigate risks arising from banks' excessive lending (excessive credit growth channel of systemic risk), such as, for example, the anti-cyclical capital buffer and rules designed to prevent excessive credit growth (e.g. limits on the loan-to-value ratio). However, the Act also allows for the imposition of additional requirements to mitigate the default risk of systemically important financial institutions (SIFIs) in order to reduce contagion risks and to promote system-wide stability. Moreover, the new Central Bank Act makes it possible to prevent the build-up of systemic liquidity risks as well.

The 'early warning' system presented in this article serves two purposes. First, it may help to identify periods characterised by excessive growth in credit and to measure its impact on the banking sector's assets and liabilities side, second, it may serve as a point of reference for timing the introduction of measures to mitigate systemic risk. Our results show that the excessive imbalances on the assets and liabilities side of the Hungarian banking system started to accumulate in 2005 Q4; the period between 2005 Q4 and 2008 Q4 was characterised by large imbalances on the assets and liabilities side (excessive credit growth and significant increase in the share of non-core or secondary liabilities within total liabilities), which are responsible for the current problems facing Hungarian banks. The article first outlines the set of criteria which may be worth considering in developing an 'early warning' system. It then presents the theoretical background of the Hungarian 'early warning' system and shows the results of the empirical analysis. Finally, the article gives a concluding summary.

CRITERIA SET FOR DEVELOPING AN 'EARLY WARNING' SYSTEM

The recent global financial and economic crisis has given new impetus to 'early warning' system-related research. At the same time, however, it has also resulted in a shift in respect of the research question. This is mainly attributable to the failure of the so-called first-generation approaches, which focused on crisis prediction. While the aim of the classical or first-generation 'early warning' systems was to predict a sort of financial crisis, the goal of the second-generation approaches was not crisis prediction, but rather the timely identification and measurement of critical financial imbalances causing systemic vulnerabilities.[3] According to the underlying philosophy, if an economy is not vulnerable (e.g. it is free from significant real and financial imbalances), then on the one hand there is a low risk that an 'own' financial crisis will emerge, and on the other hand the adverse financial and real effects of crises spilling over into the domestic economy will be less severe. The failures of the first-generation 'early warning' systems were mainly attributable to crisis definition problems (e.g. what is the precise definition of an exchange rate, a banking or a balance of payment crisis?), modelling difficulties (e.g. the relatively small number of crises, which may be an obstacle to developing a country-specific crisis prediction system) and coordination failures (e.g. the absence of harmonisation of signals generated by crisis prediction systems of various countries or regions and the lack of cross-border coordination of the related crisis prevention measures). Based on these, the following criteria may be worth considering in developing an 'early warning' system.

1. First, due to the problems with the first-generation 'early warning' systems, identifying and measuring the magnitude of financial imbalances potentially causing

[3] In an economic context, the concept of vulnerability expresses the multi-dimensional nature of crises, i.e. it denotes conditions created by real economic and financial developments which may easily lead to severe financial crises. Banking sector imbalances and fiscal and external imbalances also constitute part of this set of criteria. Consequently, vulnerability is a criteria set, while the various forms of imbalances are 'elements' of this criteria set.

systemic vulnerabilities (i.e. the second-generation approaches) might be more relevant than predicting a financial crisis.

2. Another argument in favour of the second-generation 'early warning' systems is that they may help to eliminate the main methodological weaknesses of the first-generation approaches, namely crisis definition problems and modelling difficulties arising from the relatively small number of crises.

3. Finally, in developing an 'early warning' system it may be useful to take into account regulatory aspects as well; in other words, focus should be placed primarily on those financial imbalances that can be managed with macroprudential regulation.

The Hungarian 'early warning' system has been developed in consideration of the above criteria, i.e. our objective is not crisis prediction, but rather the timely identification and measurement of the magnitude of critical imbalances on the assets and liabilities side of the Hungarian banking system. In developing the 'early warning' system, we primarily focus on the banking sector, because with macroprudential regulation banking system developments can be influenced directly, through which macroprudential policy may indirectly reduce imbalances in other segments of the economy and influence overall economic processes (e.g. imbalances in the real estate market, foreign trade deficit, short- and medium-term economic growth, inflationary developments, etc.). However, international experience suggest that – in terms of the direct and indirect costs – banking crises are the most severe as well as those crises, which do not originate from the banking sector, but in which the banking system is nevertheless significantly involved. The International Monetary Fund has estimated the direct costs of banking crises management in the year of the crisis and the subsequent five years to be 10–15 per cent of GDP on average;[4] but, according to Reinhardt and Rogoff (2008), these costs are dwarfed by the loss of tax revenues due to the banking crisis-related recession and the fiscal costs caused by the increase in social expenditure. As a result of these processes, the cumulative increase in government debt may be as much as 83 per cent on average three years following the crisis. **In other words, a stable, adequately capitalised banking system (i.e. capitalised consistently with its true risk level), which is free from substantial asset and liability side problems, may significantly improve the resilience of the entire financial system to shocks, as it is able to absorb, instead of amplify the effects of various adverse external and/or internal shocks, and can therefore also dampen business cycle fluctuations.** It is important to note, however, that imbalances potentially threatening the stability of the financial system may emerge not only in the banking sector, but also, for example, in respect of the external balance (current account) or fiscal positions. These imbalances, however, can only be partially and indirectly managed with macroprudential regulation (e.g. a foreign trade deficit might be reduced by restraining bank lending).

DEVELOPMENT OF IMBALANCES ON THE ASSETS AND LIABILITIES SIDE OF THE BANKING SYSTEM (THE THEORETICAL BACKGROUND OF THE HUNGARIAN 'EARLY WARNING' SYSTEM)

The traditional banking system channels the funds it raises from savers to borrowers. Deposits constitute the most important liabilities of banks. The increase in the stock of deposits depends on the ability of economic agents to accumulate financial wealth. In periods of economic boom, the amount of deposits is generally insufficient and may impede bank lending. Therefore, financial institutions have to rely on other sources of funding to finance the expansion of credit in periods of economic upswing. This, in turn means that banks' liability structure (the share of deposits considered stable and the share of other liabilities considered less stable within total liabilities) may vary considerably in different stages of the business cycle (Shin et al., 2011).

Similarly to the liabilities side, the structure of the banking sector's assets side is also constantly changing. This can be partly explained by the changing number of positive net present value investment projects as well as by changes in banks' risk preferences (e.g. in periods of economic downturn, financial institutions are less willing to finance risky investments). The relationships below may help the understanding of the build-up of banks' asset and liability side problems.[5] For the sake of simplicity, loans to the private sector are considered the only bank asset.[6]

[4] Sources: IMF banking crises database (http://www.luclaeven.com/Data.htm) and the related study (Laeven and Valencia, 2008).

[5] A detailed technical description of the approach can be found in the study by Shin et al. (2011).

[6] The stylised model presented provides an easily understandable, simple framework for the better understanding of developments and interactions on the asset and liability sides of banks' balance sheets. A possible future direction for extending the model could be the use of a more complex asset structure (e.g. taking into account liquid assets) and the inclusion of important off-balance sheet items (e.g. taking into account FX swaps, due to their importance in financing lending in Hungary).

Balance sheet identity

$$C = E + CL + NCLB + NCLFC, \quad (1)$$

where *C* denotes the stock of credit to the private sector, *E* denotes the amount of the banking system's capital stock, *CL* denotes deposits considered as the 'primary', or core liability of financial institutions, *NCLB* and *NCLFC* denote interbank and external liabilities respectively, which are the 'secondary' or non-core liability of banks.

Leverage I.

$$L = C / E, \quad (2)$$

where *L* denotes leverage.

Generally, financial institutions are willing to hold as much capital as they need to protect them against unexpected losses – in other words, the amount of economic capital required to cover unexpected losses must be just equal to the value-at-risk (VaR) of a given asset portfolio. If *V* denotes value-at-risk per unit of loan, then the amount of economic capital required as a buffer against unexpected losses is the following.

Economic capital

$$E = V \cdot C, \quad (3)$$

that is leverage can also be expressed using the following formula.

Leverage II.

$$L = C / E = 1/V. \quad (4)$$

Based on formula (4), leverage is procyclical – in other words, it is high due to the low value-at-risk of banks' asset portfolio in periods of economic upswing *(V,* i.e. value-at-risk, falls; and *L*, i.e. leverage, increases), while it is low due to the high value-at-risk of banks' asset portfolio in times of economic recessions (*V,* i.e. value-at-risk, increases; and *L,* i.e. leverage, falls).[7] Consequently, the 'balance sheet capacity' of financial institutions (the maximum size of their balance sheet) is determined by the amount of their available capital stock and the capital requirement per unit of loan.

During periods of economic upswing, the balance sheet capacity of financial institutions rises for two reasons. First, improving profitability increases the capital base and, second, the capital requirement per unit of loan falls, due to diminishing credit risks. These factors in turn contribute to an improvement in banks' ability and capacity to lend, i.e. to the increase in the supply of credit. If the rate of credit growth significantly exceeds the growth rate of deposits – that is the growth rate of core liabilities (the expansion of credit is not followed by an equal increase in deposits) – then banks' borrowing from external sources (non-core liabilities) increases. As a result the share of deposits within banks' total liabilities may fall significantly. This may be a problem primarily because deposits are more stable compared to non-core liabilities (interbank and foreign funds); they are a more predictable source of funding, less exposed to the adverse effects of changes in the economic cycle and investor sentiment. Consequently, the change in the liability structure of banks may provide useful information about the stickiness of funding, i.e. about the size of financial institutions' exposure to funding liquidity risk. It is also important to note that a change in the liability structure may not only increase banks' 'funding' liquidity risk, but may also raise contagion risks via the interbank market.

In contrast with economic upturns, financial institutions' 'balance sheet capacity' may fall for two reasons during periods of economic downturn. First, banks' capital stock may decline due to rising credit losses and, second, the capital requirement per unit of loan rises due to an increase in credit risks. As a consequence, banks may become capital constrained. In extreme situations, i.e. in times of very severe economic downturn, these developments may even lead to a credit crunch.

Consequently, an 'early warning' system, developed for the banking system, should be capable of capturing problems emerging simultaneously on the asset and liability sides of the banking sector. An explanation for this is that a deterioration in banks' loan portfolio quality, accumulated as a result of excessive lending, may result in an increase in financial institutions' 'funding' liquidity risk, the magnitude of which, however, depends primarily on their liability structure, i.e. the share of non-core, more volatile liabilities (interbank and foreign liabilities) within total liabilities. **The major risk is if financial institutions fully utilise their increasing lending capacity due to the expansion of their**

[7] The relationship can be easily realised with knowledge of the arguments of the Basel capital function. In periods of economic upswing, the value of the risk parameters expressing the credit risk of the portfolio (default probability, loss given default) are much lower than those observed in times of recession, i.e. with identical portfolio size, portfolio composition and confidence level, the value at risk of the portfolio during a period of upturn may be significantly lower than the value at risk of the portfolio in periods of economic downturn.

balance sheet capacity by significantly easing lending standards, which may entail a dilution of loan portfolio quality (the implicit accumulation of credit risks in periods of economic boom) and excessive lending is financed mainly from non-core liabilities (the implicit accumulation of 'funding' liquidity risks in periods of economic boom).

It is important to note that the default risk of individual financial institutions is not only influenced by the extent to which their credit losses and 'funding' liquidity risks increase due to various shocks, but also by the reaction of other banking sector participants to the shocks affecting the system. The strength of systemic effects depends on the number of banks reacting to the shocks, the similarities of their behaviour and the size of the reacting financial institutions. For example, banks may react to the deteriorating 'funding' liquidity position by shortening the maturities of their assets, lengthening the maturities of their liabilities, increasing the quantity of their liquid assets and reducing the quantity of their illiquid assets. Banks' reactions may primarily affect the markets of illiquid assets and stable funds; such reactions may lead to a fall in asset prices in the former and an increase in the price of stable funds in the latter. The decline in asset prices may entail further increases in losses and banks' default risk as well as a further deterioration in the 'funding' liquidity position. That may necessitate additional adjustments by banks on the asset and liability sides of their balance sheets. As a result, a credit and 'funding' liquidity risk spiral may ensue, which may lead to the collapse of market liquidity and, in an extreme case, the meltdown of the entire financial system.

EMPIRICAL ANALYSIS

In this section, we outline the econometric background of the Hungarian 'early warning' system. In the first step of the empirical analysis, by relying on the theoretical framework presented earlier the variables are chosen which may help to capture imbalances on the banking sector's asset and liability sides, asset price movements adversely affecting developments in the value of banks' assets, the current state of the business cycle and the product risk structure of the loan portfolio. The asset side imbalance was approximated with the deviation of bank loans to the private sector (exchange rate adjusted household and corporate loan stock) from its trend (loan stock/trend of loan stock), i.e. with the credit cycle. The greater the amplitude of the credit cycle, the greater the imbalance on the asset side of the banking sector's balance sheet (e.g. significant credit growth in good times due in part to an easing of lending standards, and a sharp curtailment of lending in times of recession due to materialising credit risks). The liability side imbalance was approximated with the deviation of the exchange rate adjusted loan-to-deposit ratio[8] from its trend [liquidity cycle=(loan-to-deposit ratio)/(loan-to-deposit ratio trend)]. The more the current loan-to-deposit ratio exceeds its equilibrium level, i.e. the quotient of the ratios exceeds 1 or 100 per cent, the more financial institutions finance lending by raising less stable, secondary funds, and the more the liability side imbalance of the banking sector (latent 'funding' liquidity risk) will increase. For example, if the equilibrium value of the loan-to-deposit ratio is 1.06 and its current level is 1.08, then the deviation of the loan-to-deposit ratio from its trend is approximately 2 per cent (1.08/1.06). The deviation of real GDP from its trend was taken as the proxy variable of the business cycle (real GDP/real GDP trend). In the empirical analysis, the deviation of the FHB house price index from its trend was taken as the asset price proxy (FHB house price index/FHB house price index trend). This variable captures movements in house prices more directly related to banks' lending activity.[9] Finally, the share of foreign currency private sector loans within total loans to the private sector was employed to approximate the 'product risk' structure of credit.[10] The relationship between imbalances emerging on the asset and liability sides of the banking system was modelled in a regime switching vector autoregressive model framework (Markov-switching VAR).[11] According to the underlying intuition, economic agents behave differently in distinct states of the world or regimes (e.g. in times of

[8] In performing the calculations, we decided to use the exchange rate adjusted loan-to-deposit ratio because the numerator of the loan-to-deposit ratio increases by more than its denominator as a result of exchange rate depreciation, due to the high ratio of foreign currency loans and the relatively low ratio of foreign currency deposits – in other words, the value of the 'unadjusted' indicator may increase sharply as an effect of an exchange rate depreciation, which may falsely suggest a change in the liability structure (increasing demand for secondary liabilities). It is important to note that in interpreting a change in the liability structure we focus exclusively on on-balance sheet items.

[9] Based on international experience, excessive credit growth is generally associated with rapid rise in residential property prices. In periods of recession, i.e. when credit risks materialise, banking losses are not only increased by the increase in the number of defaults, but also by the simultaneous decline in the value of properties used as collateral.

[10] In filtering a trend using the Hodrick–Prescott filter, we used the 400 000 lambda value for the credit variable by taking into account the recommendation of the Basel Committee and the 1600 lambda value for the liquidity and business cycles, (recommended value in the case of quarterly time series).

[11] The MS_Regress package, developed for MATLAB, was used to produce the estimate. It is downloadable at: http://www.mathworks.com/matlabcentral/fileexchange/15789.

Table 1
Descriptive statistics of model variables in regime 1 and regime 2

Estimation period	1998 Q2–2011 Q2		
Regime 1	**2005 Q4–2008 Q4**	**Regime 2**	**1998 Q2–2005 Q3; 2009 Q1–2011 Q2**
Regime 1 (credit cycle, mean)	112.6%	Regime 2 (credit cycle, mean)	98.4%
Regime 1 (credit cycle, standard deviation)	2.1%	Regime 2 (credit cycle, standard deviation)	7.9%
Regime 1 (liquidity cycle, mean)	102.2%	Regime 2 (liquidity cycle, mean)	97.1%
Regime 1 (liquidity cycle, standard deviation)	2.6%	Regime 2 (liquidity cycle, standard deviation)	4.0%
Regime 1 (growth rate of private sector loans to foreign currency private sector credit compared to the previous quarter, mean)	3.6%	Regime 2 (growth rate of private sector loans to foreign currency private sector credit compared to the previous quarter, mean)	0.7%
Regime 1 (growth rate of private sector loans to foreign currency private sector credit compared to the previous quarter, standard deviation)	2.6%	Regime 2 (growth rate of private sector loans to foreign currency private sector credit compared to the previous quarter, standard deviation)	2.8%
Regime 1 (asset price cycle, mean)	101.0%	Regime 2 (asset price cycle, mean)	98.0%
Regime 1 (asset price cycle, standard deviation)	1.3%	Regime 2 (asset price cycle, standard deviation)	4.7%

Note: The asset price cycle was approximated with the FHB house price index.

expansion and low growth) – in other words, the evolution of economic and financial developments is regime specific (e.g. periods of upswing are characterised by excessive credit growth, a shortening of funding maturities and a decline in the ratio of total liabilities to stable funds; periods of economic downturn are characterised by a sharp curtailment of lending, a lengthening of funding maturities and an increase in the ratio of total liabilities to stable funds). The econometric method can be used to quantify the probability of staying in different states of the world or regimes, where the regime probabilities can be considered as an 'early warning' indicator derived from the system. In the model, regime switching basically depends on two factors: the past behaviour of model variables and the so-called transition probabilities, i.e. a 'deterministic' and a stochastic factor. In the calculations, we assumed the existence of two regimes: an expansionary and a low growth regime.[12] The model itself does not identify the regimes, i.e. which is the low growth and which one is the expansionary period. The regimes can be identified based on the descriptive statistics of the model variables and on the basis of the estimated model parameters. The table below contains the mean and standard deviation of the model variables in regime 1 and regime 2.

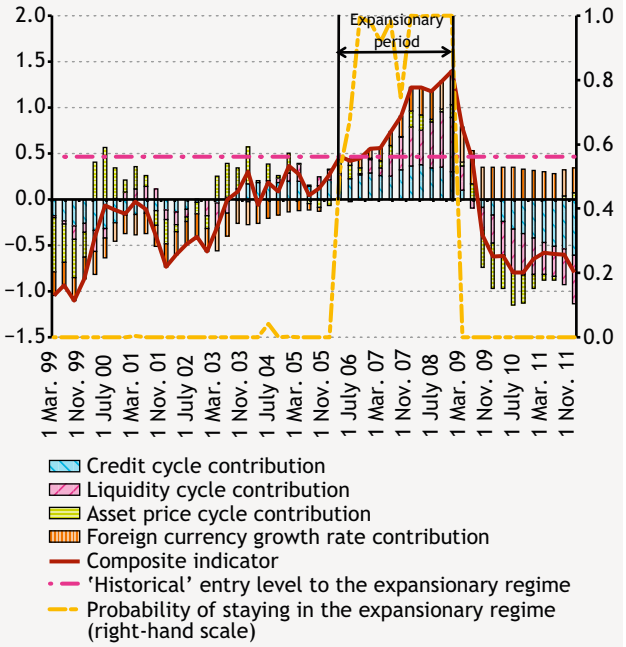
According to the results of the Table 1, the means of model variables in regime 1 exceed the average values in regime 2, and the means of the variables in regime 1 are above trend, while in regime 2 they are below trend. Furthermore, it can be seen that the standard deviation of the variables in regime 1 is lower than the standard deviation in regime 2 – in other words, regime 2 is characterised by a greater degree of uncertainty than regime 1, which can be generally observed in periods of economic downturn. A similar conclusion can be drawn by examining the constants and variances of the model. The values of regime-specific constants in regime 1 exceed those in regime 2; however, the direction is just the opposite in the case of the variances: regime 2 is characterised by higher volatility and regime 1 is characterised by lower volatility. Based on the behaviour of the model variables (above trend values and lower volatility in regime 1; below trend values and higher volatility in regime 2) and the regime-specific values of the model parameters, regime 1 is the expansionary regime and regime 2 is the low growth regime. This result partly coincides with the findings of a study examining periods of excessive credit growth in CEE countries written by MNB authors in 2006 (Kiss et al., 2006), i.e. with the finding that household credit growth in Hungary since 2004 was stronger

[12] Two regimes can be identified on the basis of the estimated Kernel density functions of the liquidity and credit cycles; the estimated empirical distribution of both variables is bimodal.

than justified by economic fundamentals, the deviation of which from the equilibrium path reached its maximum in 2009, exceeding its estimated equilibrium level by some 13 percentage points.

Our 'early warning' indicator, i.e. the probability of staying in the expansionary regime, derived from the model, is presented in the chart below. It shows that this probability clearly identifies the period of expansion – in other words, its values are close to 1 throughout the expansionary period. As mentioned earlier, regime switching depends on the past behaviour of the model variables (deterministic part) and the so-called transition probabilities. In order to better track the deterministic processes driving regime switching, a composite indicator was also built from the standardised model variables.[13] This index helps, on the one hand, to track the factors driving changes in the vulnerabilities of the banking sector (asset, liability side imbalances, and imbalances on the asset markets) and, on the other, to measure the extent to which the individual factors (credit cycle, liquidity cycle, asset price cycle, product risk structure of the loan portfolio) contribute to the vulnerabilities of the banking sector. High values of the composite indicator may signal a high level of banking system vulnerabilities, and an increase in the index may indicate a build-up of vulnerabilities, while low values may imply an absence or low level of vulnerability (pre-expansionary period), on the one hand, and a correction following a period of the build-up of vulnerabilities (post-expansionary period), on the other. The chart shows that the Hungarian banking sector entered the period of increasing vulnerability (persistent and positive trend deviations of credit and liquidity cycles, i.e. the development of asset and liability side imbalances) at the 0.47 value of the composite index and exited at its 1.37 value. At the time of entry into the expansionary period, the deterministic factor of the regime switch was driven primarily by positive trend deviations of the credit cycle, and, secondly and thirdly, by positive trend deviations of the asset price and liquidity cycles. In the correction phase, negative trend deviations of the liquidity, credit and asset price cycles were responsible for the fall in the composite index. It is important to note that the expansionary entry and exit levels of the composite index should not necessarily be considered critical levels remaining valid in the future, but as a kind of reference point. Furthermore, it is also important to note that an unambiguous increase in vulnerabilities in the banking sector requires a persistent, positive and simultaneous trend deviation of the model variables, as expressed by the steady and persistent rise in the composite index in the chart.

Chart 1
Probability of staying in the expansionary regime and the composite index built from the standardised model variables



SUMMARY AND CONCLUSION

The article presents a new tool developed for the identification of critical asset and liability side imbalances of the Hungarian banking sector. In developing the system, the focus was on banking sector developments, because, on the one hand international experience suggests that the direct (e.g. bank consolidation costs) and indirect costs (e.g. costs of a real economic downturn) of banking crises are the highest – in other words, timely identification and mitigation of asset and liability side problems of the banking sector may help avoiding serious banking system disruptions and, in the most severe case, banking crises. On the other hand, the banking sector can be considered stable and highly resilient to shocks if no significant imbalance evolves on either the asset or liability sides of banks' balance sheets. In that case, the banking sector absorbs rather than amplifies the adverse effects of the various financial and real economic shocks – in other words, its behaviour will be less procyclical.

In terms of the stability of the banking sector, persistent and significant credit growth and the simultaneous dilution

[13] Standardisation was performed by subtracting the sample mean from the 'raw' model variables and dividing this difference by the sample standard deviation.

of the portfolio quality (latent build-up of credit risks) can be considered the main risk factors, if these are associated with liability side problems, i.e. the increase in the ratio of total liabilities to stable funds (latent build-up of liquidity risks). If this occurs, the effect on banks' default risks of the interactions between asset and liability side strains in times of the materialisation of credit risks may intensify significantly.

According to our results, the significant asset and liability side imbalances (excessive credit growth, and sharp increase in the ratio of total liabilities to stable funds), responsible for the current problems of the Hungarian banking system, emerged in the period between 2005 Q4 and 2008 Q4.

The 'early warning' system presented may help decision-makers to identify excessive asset and liability side imbalances in the banking sector's balance sheet in a timely manner and may serve as a point of reference for the timing of the introduction of macroprudential regulatory instruments reducing such vulnerabilities.

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Péter Koroknai and Rita Lénárt-Odorán: Developments in external borrowing by individual sectors[1]

This article examines trends and developments in the external financing of the Hungarian economy from the perspective of external borrowing by individual sectors. In the pre-crisis period, economic agents' spending exceeded their revenues, as a result of which the country had to rely on foreign borrowing. In addition to direct external borrowing by the government and companies, the banking system also relied on external borrowing to a large extent in relation to its lending to companies and households. This was also reflected in a rise in the country's external debt indicators, which added to the vulnerability of the Hungarian economy.

During the crisis, domestic demand fell and the previous high deficit on the balance of payments turned into surplus. This also means that, due to a rise in the savings of economic agents, the country no longer has to rely on external borrowing and net repayment of loans taken out earlier is underway, i.e. earlier borrowing is being followed by an outflow of funds. Repayment of external funds is not occurring in each sector. On the one hand, the repayment of loans granted to the private sector triggered a sizeable outflow of funds from the banking system, while on the other hand, there was hardly any change in net external funds granted to the corporate sector; at the same time, the consolidated general government continues to borrow.

The adjustment process, which started after the crisis, is likely to continue in the years to come, and this may lead to a further increase in the external surplus of the economy and an acceleration of outflows of foreign funds. Our forecast for the period to 2013 implies a slower decrease in external funds granted to banks, but on the other hand, in contrast to earlier years, a net outflow of funds is likely to materialise at the level of public finances as well. As regards debt indicators, the repayment of foreign funds is not yet fully reflected in lower external debt ratios, due to the depreciation of the forint. With a more marked outflow of funds, a quick fall in external debt ratios is also expected to materialise.

INTRODUCTION

Developments in external equilibrium and external debt indicators are key to the financial vulnerability of the country. One of the underlying reasons why improved external financing capacity (i.e. net lending), the outflow of funds from certain sectors and changes in debt indicators are important is that they may influence the risk perception of the Hungarian economy and risk premia. Developments in external funds held by the individual sectors may also help assess how external funds borrowed by the banking system were affected by heavy foreign currency lending to households and the financing of the fiscal deficit.

Fundamentally, there are three approaches to the analysis of external balance processes (Chart 1 summarises the various analysis options).

- *The real economy approach* shows – on the basis of the external financing capacity/requirement (i.e. net lending/borrowing) calculated as the sum of net exports recorded in the balance of payments, the balance of income and the balance of transfers – whether domestic use (e.g. consumption and investment) is lower/higher in overall terms than the revenues generated. Before the outbreak of the crisis Hungary had a net borrowing position, whereas currently there is a significant amount of

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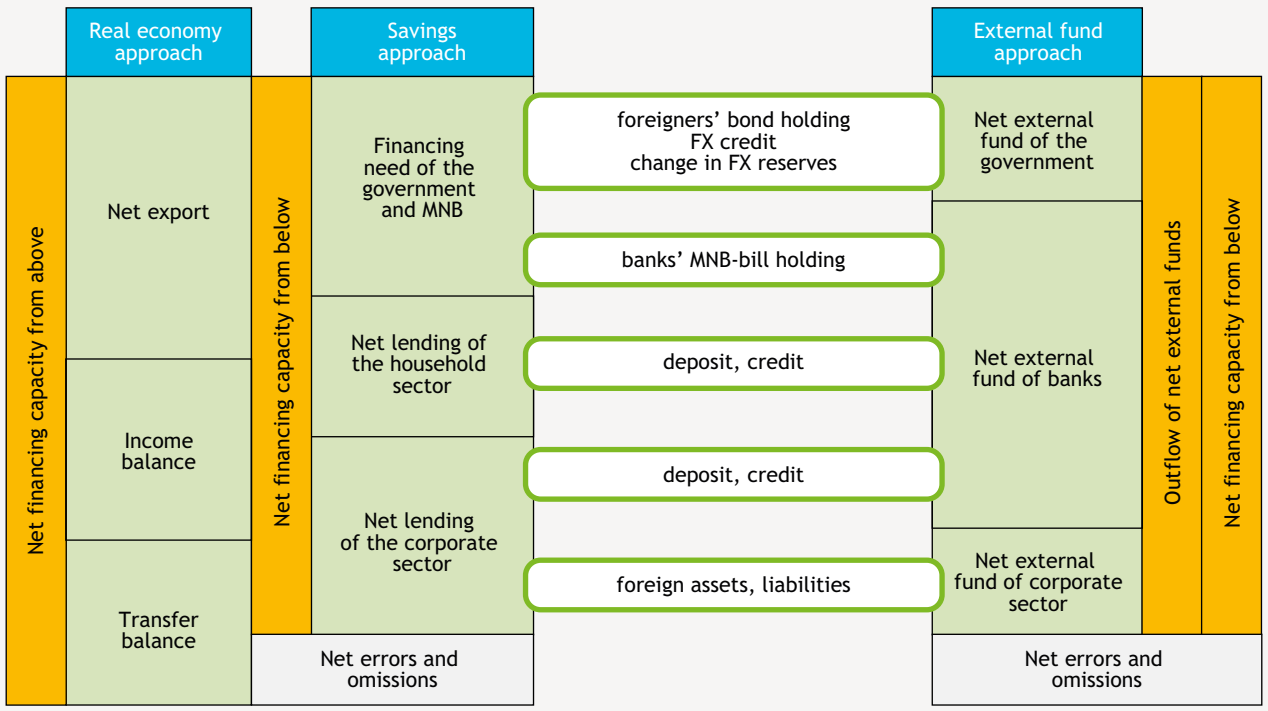
Chart 1
The external financing capacity of the sectors and a stylised chart of the outflow of external funds



external surplus, i.e. domestic use at whole economy level is lower than the revenues earned, as a result of which the country is in a net saving position.

- The second approach, i.e. the *savings approach,* is based on the fact that the sum of the financial positions of the individual economic agents is identical with that of the total savings of the economy, i.e. the external financing capacity (net lending). This approach is reflected in the financial accounts, which show the share of the individual sectors in the economy's net savings or net borrowing position. Before 2009, in Hungary the external financing requirement of the sectors was the outcome of the fact that the financing requirement of the companies and general government exceeded households' financial savings. By contrast, the net financial savings of households and the corporate sector currently exceed the general government deficit to a significant degree. Accordingly, the country has a sizeable external surplus.

- The third approach forms the basis of this article: the starting point of this approach is the financial balance that reflects the financing-side processes of the balance of payments and *focuses on the processes of borrowing*.[2] Developments in the holdings of external funds in the economy reflect savings by domestic agents and the external equilibrium of the economy. If an economy is faced with external imbalances, i.e. both the current account and the capital account show a deficit, then the borrowing of external funds is inevitable. While the economy was a net borrower before the crisis, i.e. external funds were used to finance the portion of domestic use that exceeded revenues, since the outbreak of the crisis, concurrently with the development of the economy's domestic saving position, loans taken out earlier are being repaid, i.e. funds are flowing out.[3]

It is important to identify the interconnection between domestic savings and funds borrowed abroad. Domestic sectors may have financial (asset) claims from and liabilities to each other and the rest of the world. An example of domestic financing is when government securities are purchased by households, in which case such securities are assets held by households and debt owed by the state. An

[2] The result of this approach and/or the one based on the financial savings of the sectors are/is also referred to as bottom-up financing capacity/needs, as it is based on the financial balance recorded in the bottom section of the balance of payments.

[3] An outflow of funds may, in a net sense, occur in two different ways: one is reduction in external debt (e.g. loan repayments or redemption of maturing bonds), the other is an increase in assets abroad (e.g. lending abroad or placement of deposits abroad). For instance, the outflow of banks' external funds experienced over the past few years occurred by banks reducing their assets abroad (inflow of funds) and loans borrowed abroad earlier to a much larger extent (outflow of funds). Overall, banks' financial position vis-à-vis the rest of the world has improved significantly (net outflow of funds).

example of external borrowing is when foreigners subscribe foreign currency government bonds or when multinational companies and banks borrow from their respective parent companies and parent banks, respectively. The external financing of an economy may also occur in the domestic market, typically through banks. Companies and households borrow almost exclusively from domestic banks, which, in turn, borrow abroad in order to satisfy their borrowing requirements.

Our article is structured as follows: First, we provide an overview of past developments in the net savings of the individual sectors, after which, based on the Quarterly Report on Inflation, we briefly summarise what we can expect in connection with the savings of the individual sectors in 2012 and 2013. Next, we go on to discuss the main subject matter of this article, i.e. developments in the external funds of the individual sectors. As regards the marked increase in the external financing capacity, we focus on the sectors whose outflows of funds have resulted in this increased capacity. The next section covers the changes which the expected pronounced rise in external financing capacity is likely to bring about in the funds available to the major institutional sectors. Finally, we study the changes that have occurred and those yet to occur in the debt indicators which depend primarily on developments in external funding.

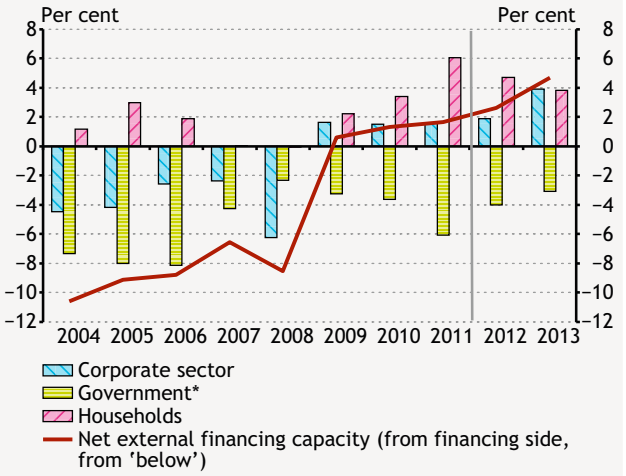
FINANCIAL SAVINGS OF INDIVIDUAL SECTORS

In this section, we rely mainly on the analytical framework used in the inflation reports. External financing capacity is the sum of the financing capacity/requirement of general government (consolidated with the MNB), households and companies.

Prior to the outbreak of the crisis, the reduction in the general government financing requirement was broadly counterbalanced by the decline in the financial savings of the private sector. Consequently, Hungary's external balance did not improve materially. Adjustments after 2006 improved the fiscal balance markedly: the SNA-based (pension fund savings-adjusted) GDP-proportionate financing requirement of general government dropped from 8 per cent in 2006 to 2 per cent in 2008 (Chart 2). At the same time, these fiscal adjustments resulted in a significant deterioration in the private sector's income position. The financing requirement of the corporate sector grew, while households reduced their net financial savings, as a result of smoothing consumption. Thus, overall, the net savings of the domestic sectors declined, and consequently the external financing requirement of the Hungarian economy did not decrease. Accordingly, the country's dependence on external funding amounted to around 8 per cent of GDP, similar to 2006.

After the outbreak of the crisis, the government's financing requirement rose, but due to private sector adjustments, the external balance improved spectacularly. After the outbreak of the crisis, the inflow of external funds fell dramatically. The drying up of funds led to a decline in lending and harsher liquidity constraints, and forced the private sector to adjust quickly, which was reflected in a downturn in borrowing. The earlier significant financing requirement of the corporate sector dropped, and then turned into a net savings position. On the real economy side, this was mainly attributable to a fall in gross capital formation (investment and inventory building). The increase in the sector's financial savings was also boosted by rising transfers from the EU. The underlying reason for a rise in the general government financing requirement in the first three years of the crisis was falling tax revenues in response to the cyclical position; in 2011 lower personal tax burden was another contributing factor. Households' disposable income, which grew due to lower personal income tax rates, went into mostly financial savings, which grew further in 2011 as a result of the disbursement of pension fund real yields. Households were also cautious about borrowing and decided to pay off their loan debts, which also added to the sector's net financial savings. Thanks to the adjustment of the private sector and, within

Chart 2
Developments in the net lending position of the individual sectors
(as a proportion of GDP)



** General government includes the central budget, local governments, ÁPV Zrt., quasi-fiscal entities (MÁV and BKV), the MNB and entities implementing investment projects which are formally PPPs, but are initiated by the government. The SNA-based financing requirement is shown for general government, which does not include payments into pension funds and is different from the official (ESA) balances.*

that, companies, the country's external financing capacity improved significantly. All in all, the savings of domestic economic agents have been in the positive domain since 2009, as a result of which there has been no need for external borrowing; in fact, the past few years has even seen an outflow of funds.

In 2012 and 2013, the country's external equilibrium position is expected to continue improving significantly. The *Inflation Report* claims that further increases in net exports and anticipated higher EU transfers will result in additional improvement in the external financing capacity of the Hungarian economy. Net exports are boosted by the launch of car manufacturing, as well as by developments in imports, which, in response to weak domestic consumption, are just moderate. The reasons underlying the increase in the net saving position at the whole economy level is the improved financial position of the general government and companies. Lower fiscal deficits are the outcome of the Structural Reform Programmes, in response to which domestic demand is likely to remain subdued. Higher corporate savings are due to weaker investment and higher EU transfers. Households' savings may decrease as a result of the absence of one-off items boosting savings (disbursement of real returns by pension funds and early repayments of foreign currency loans). Overall, the external financing capacity of the Hungarian economy is likely to approach 3 per cent of GDP this year and 5 per cent next year; i.e. an outflow of funds amounting to a total of around 8 per cent of GDP is expected to materialise over two years.

HOW HAS THE CRISIS AFFECTED BORROWING BY THE INDIVIDUAL SECTORS?

The next section presents an overview of external borrowing by the individual sectors. For the purpose of this analysis, we rely on the sectoral breakdown of the financing side of the balance of payments, where the net liabilities (assets and debts) of direct investment capital, portfolio equities and other debt liabilities are totalled.

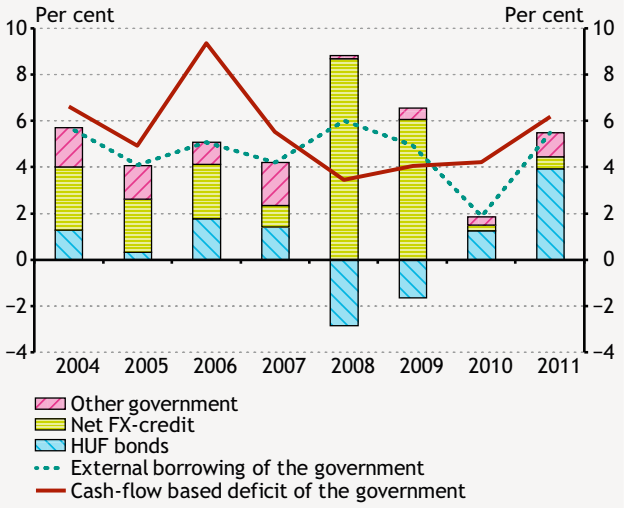
Two major differences should be borne in mind in connection with the net savings of the individual sectors. One is that, except for foreign currency purchases, households do not have any direct link with the rest of the world. The other is that most loans to the private sector are channelled via banks; i.e. part of financing the private sector materialises through the balance sheet of the banking system in the process of external financing. It follows that there are the following sectors on the financing side of the balance of payments: general government, the MNB, the banking system and other private sectors (mostly transactions by non-financial corporations with the rest of the world).

General government

Before the crisis, general government used external funds to cover only part of the deficit; in 2008 and 2009, however, external funds in an amount exceeding the deficit were used. The government's reliance on external funds is linked to the financing of the fiscal deficit: the government's issuance of foreign currency bonds, purchases of government securities by foreigners and other minor financing items (privatisation, development loans from international organisations and the pre- and post-financing of EU transfers) represent inflows of external funds. During the years preceding the crisis, in order to finance the deficit, the government relied on both external funds and purchases of government securities by domestic sectors. However, after the outbreak of the crisis, the situation changed. As domestic sectors consistently downsized their holdings of government securities till 2011 on the whole, external borrowing by the government was similar in volume to what we experienced earlier (Chart 3), despite a decline in the GFS (the cash-flow based) deficit in 2008 and 2009.

There were, however, two reasons behind this borrowing in an amount exceeding the deficit. One was that, due to problems in the government securities market, the issuance

Chart 3
The borrowing requirement and external borrowing of general government
(as a proportion of GDP)



Note: The chart plots the GFS, or cash-flow based deficit to be actually financed rather than the borrowing demand on an accrual basis in Chart 2. In 2010, the government's external borrowing was rather modest thanks to the repayment of the loans granted to banks earlier (HUF 200 billion) and an increase in the mark-to-market stock, due to the weakening of the euro (HUF 250 billion).

of longer-term government securities was temporarily suspended, while the sale of short-term securities remained undisturbed; simultaneously, repayments at the maturity dates of the government securities issued earlier had to continue. The other was that in an uncertain international situation, in order to boost foreign investor confidence, the government strove to increase its reserves of financing funds. This led to an enhanced role of foreign currency loans granted by international organisations and consistently strong external borrowing. In the past two years, the government's net borrowing has been modest relative to earlier years; by contrast, purchases of government securities by the rest of the world has been on the increase in the context of rising borrowing demand.

The government's foreign currency borrowing and the stock of MNB bills

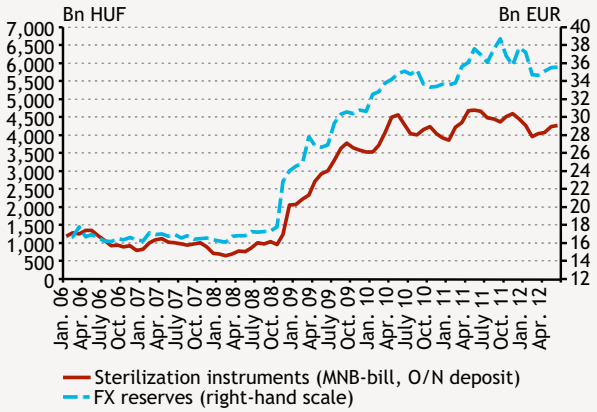
When the government takes out a foreign currency loan, it then places the foreign currency it receives with the central bank, as a result of which the MNB's FX reserves increase. The budget uses the loan taken to finance the deficit, i.e. it needs HUF and has the loan converted into forint by the MNB. Thus, the government's foreign currency deposit is converted into a forint deposit without any change in the MNB's FX reserves. When the government makes payments (e.g. it pays pensions or wages to public servants), it depletes its forint deposit placed with the MNB. In response to the payments, the economy's liquidity increases (economic agents place the funds received as deposits with banks, or the funds spent by them are placed by the agents as deposits at the banks which receive them), which, ultimately, increases the funds of the banking system. Banks place such excess liquidity with the MNB in the form of two-week bills, i.e. a decrease in the government's deposit portfolio with the MNB is counterbalanced by a rise in holdings of MNB bills. All in all, any foreign currency loan granted to the government increases the MNB's liability due to an increase in the stock of MNB bills. Due to the above process, the stock of MNB bills increases similarly to FX reserves, with the latter growing, as a rule, in response to the government's net foreign currency borrowing (Chart 4). Concurrently with the government's foreign currency borrowing, the MNB also borrows from domestic agents (typically from banks) by issuing MNB bills. Ultimately, the general government consolidated with the MNB finances the increase in the FX reserves and government spending by means of the foreign currency loans borrowed and two-week bills.

The above process has two consequences as to external borrowing.

1. As the MNB's FX reserves increase (an increase in foreign assets entails the outflow of external funds) concurrently with the government's foreign currency borrowing (external borrowing), the financing of the budget through foreign currency loans means zero external borrowing in net terms for the general government in the broader sense. Accordingly, developments in external borrowing by the general government should be examined consolidated with the MNB (Chart 5).

2. Concurrently with foreign currency borrowing, the stock of MNB bills, the majority of which are held by banks, also rise. As banks also need external funds to finance their assets, ultimately, this also means that the government's foreign currency borrowing contributes to a rise in banks' external borrowing (or a lower outflow of foreign funds relative to the available possibilities); this issue is revisited in the section on developments in external borrowing by banks.

Chart 4
Developments in FX reserves and the sterilisation portfolio



After the outbreak of the crisis, the government's external borrowing continued even after correcting for growth in FX reserves. The discussion presented in the above box reveals that the government's external borrowing should be examined on a consolidated basis with the MNB. According to this argument, although an outflow of funds that materialises in response to an increase in FX reserves reduces the size of external borrowing significantly, the government's external borrowing was typical in both the pre- and post-crisis period. There was no external borrowing at the level of the general government consolidated with the MNB for two years. In 2005, the privatisation of

Chart 5
Borrowing requirement and external borrowing of the general government consolidated with the MNB
(as a proportion of GDP)

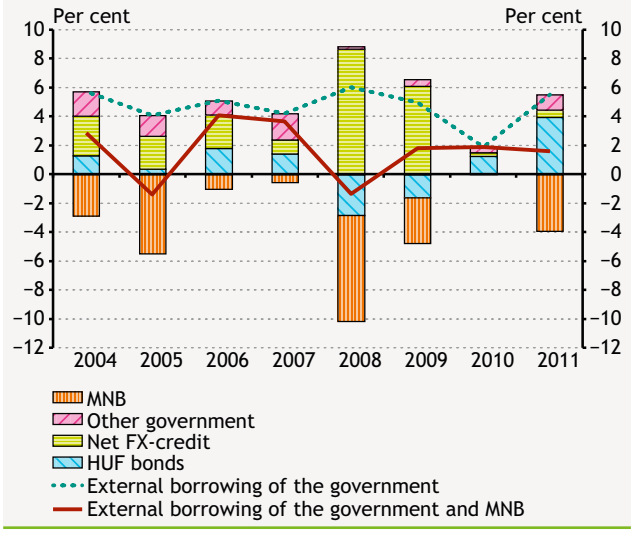
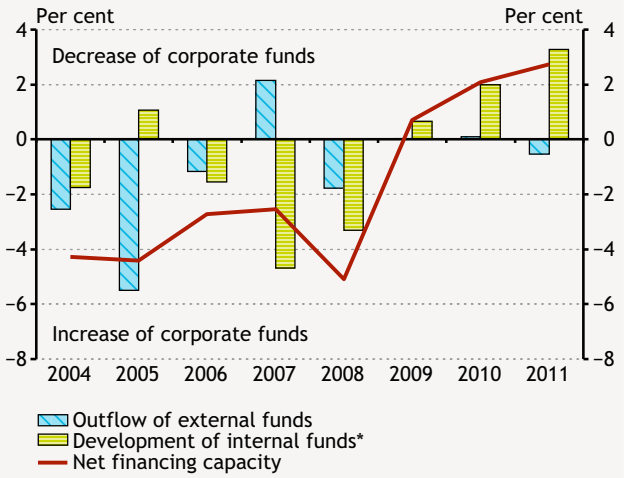


Chart 6
Breakdown of the corporate sector's financing capacity by net domestic and foreign liabilities
(as a proportion of GDP)



** Changes in the position vis-à-vis banks account for a major part of this (deposits less loans).*
Note: Corporate financing capacity as illustrated in the chart does not include the financing capacity of banks, because the breakdown of funds is based on the balance of payments, which records the data of the non-bank private sector.

Budapest Airport increased the FX reserves by an extent exceeding 2 per cent of GDP (this outflow of funds reduced borrowing by the consolidated general government); in 2008, at the onset of the crisis foreign investors sold a huge amount of government securities.[4] Over the past three years, external borrowing by the general government consolidated with the MNB has been rather stable, hovering at around 2 per cent of GDP.

The corporate sector

Prior to 2008, companies borrowed heavily abroad. During the years leading up to the crisis, the corporate sector financed its investment and business operations through strong domestic and external borrowing, which materialised, typically, through borrowing in an amount exceeding the placement of deposits, equity financing by the rest of the world and taking out foreign loans (e.g. loans from banks or parent companies). Thus, in addition to the banking system, the corporate sector also borrowed strongly abroad directly and indirectly by taking out foreign currency loans with the intermediation of banks (Chart 6).[5]

At the same time, however, overall, there has been no outflow of foreign funds in net terms from the corporate sector – the sector's rising financial savings are due to a decline in bank loans. After the outbreak of the crisis, the sales opportunities of companies began to deteriorate, which, in turn, led to falling investment spending and, ultimately, a decline in borrowing demand. Furthermore, the loss of confidence in response to the crisis also resulted in the drying up of external funds, which also narrowed companies' opportunities to access to foreign and domestic financing. As a result of very weak demand for and supply of loans, external and domestic borrowing by the corporate sector declined. At the same time, however, in contrast to the withdrawal of funds, no material outflow of foreign funds materialised at an aggregate level.[6] Overall, neither foreign owners (shareholders) nor foreign banks reduced the funds granted to domestic companies[7] – a development which, as we shall see, runs strongly counter to trends in banks' external funds. This also implies that almost the

[4] In response to the foreign currency loans granted by the IMF/EU (borrowing), the MNB's FX reserves rose (outflow of funds), thus, all in all, it did not affect external borrowing.

[5] An exception to this is the year 2007, when the purchase of MOL's treasury shares reduced investments by the rest of the world in Hungary by close to EUR 2 billion.

[6] It should be noted that a zero outflow of funds at an aggregate level is the result of rather different processes on a stand-alone basis. Many companies saw their borrowing opportunities fall concurrently with the deepening of the crisis in Europe, and adjustments for the crisis are also likely to have entailed a forced reduction in funds. This impact is likely to have been counterbalanced by the fact that the parent banks of other companies continue to grant shareholders' loans to their subsidiaries, and companies are also likely to downsize their foreign assets.

[7] The 2011 data were influenced by two individual impacts, which roughly counterbalance one another. The government's purchase of MOL shares reduced the ownership share of the rest of the world in domestic companies, i.e. this represented an outflow of funds. In the wake of the sale of assets subsequent to the transformation of the private pension fund scheme, the corporate sector's claim against the rest of the world declined to a corresponding extent, i.e. an inflow of funds in a similar amount materialised.

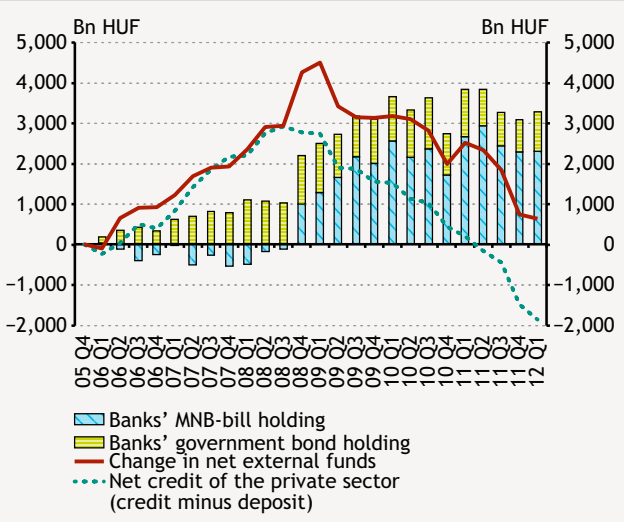
entire rise in corporate financial savings stemmed from an improvement in the position of companies vis-à-vis banks (i.e. mostly from loan repayment).

Banking system

Before the crisis, the net savings of the private sector were in the negative domain. The banking system borrowed abroad to finance the foreign currency loans granted to households and companies. Before the crisis, on the whole, the private sector was in a net borrowing position: in keeping with the normal functioning of the economy, the corporate sector had a sizeable financing requirement, whilst households' net financial savings had dropped close to zero by 2008 as a result of heavy borrowing. Likewise, before mid-2008, net borrowing by the private sector from banks exceeded the banking assets (bank deposits and bank bonds) of the private sector (Chart 7, dashed line). The rise in foreign currency lending subsequent to the tightening of the home subsidy scheme contributed to a sizeable pick-up in lending. The banking system looked mainly to parent banks for additional funds.[8] In the meantime, liquid assets (government securities and MNB bills) in the banking system grew only moderately.

Over the past few years, the increase in private sector financial savings went hand in hand with a sizeable withdrawal of funds by banks. On the other hand, however, due to the crisis, banks' needs to hold liquid assets also grew, as a result of which banks' external funds declined more slowly than would have been justified on the basis of deposit placements and lending. In response to the crisis, the private sector's sizeable net borrowing position – amounting to 6 per cent of GDP – turned into a net lending position of 4 per cent by 2009. As mentioned in the section on the corporate sector, the improvement in the position vis-à-vis banks played a decisive role in this. Low credit availability for the corporate sector and the deteriorating income position led to a downturn in demand for credit in the household sector as well, i.e. households' position vis-à-vis banks improved significantly. A major proportion of the financial savings comes from the decline in (repayment of) bank loans; the increase in holdings of bank securities was also a contributing factor. This means that the increase in the net savings of the private sector boosted banks' liquid assets considerably. Banks used this excess liquidity to finance two things. One is that on the asset side their holdings of MNB bills expanded further in response to the sterilisation portfolio growing concurrently with a rise in the FX reserves and a growing need to hold liquid assets (Chart 7). The other is that banks used their remaining liquid assets to repay loans they had borrowed abroad (Chart 7, the solid line, and the right-hand side of Chart 8 – banks borrowed abroad before the crisis; since 2009, the outflow of funds has been dominant).

Chart 7
Allocation of banks' external funds to net lending and liquid assets
(cumulated transactions)



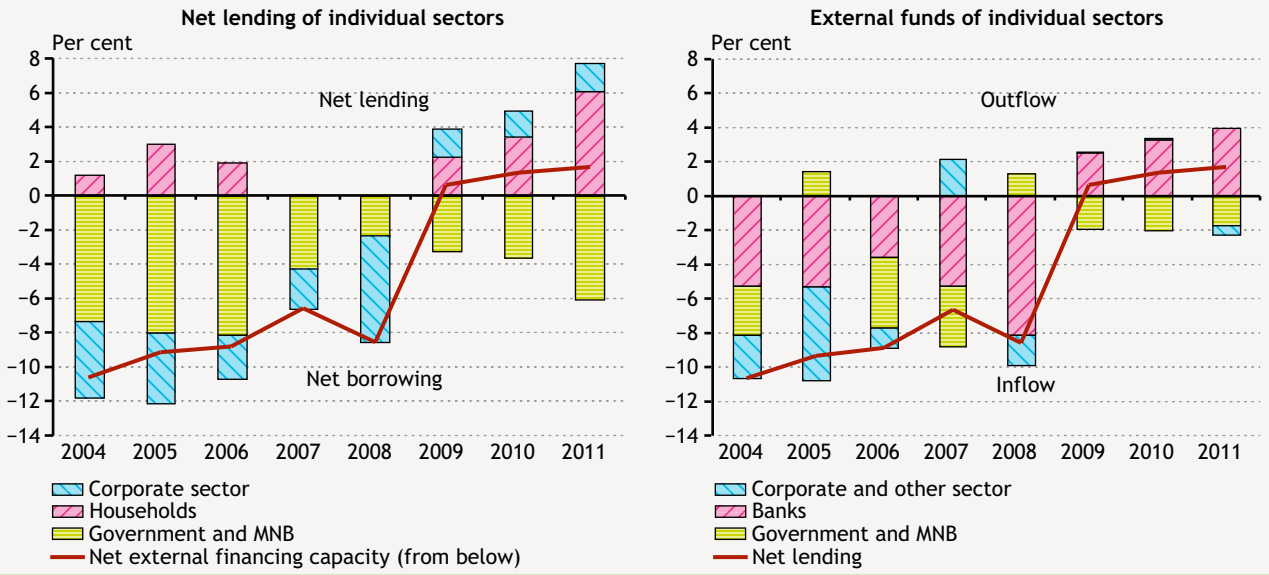
The early repayment scheme in late 2011 and early 2012 significantly affected the financing processes of banks. During the early repayment programme, concurrent with the repayment of loans, the reduction in the external debt of banks accelerated, and this was only cushioned to a limited extent by the rising external financing stemming from capital increases at banks (i.e. inflows of direct investment capital). Due to reporting obligations, information on the anticipated scope of early repayments was already available in late 2011, and thus the banking system was able to take this into account during its customary end-of-the year balance sheet management. This is also likely to have played a role in the phenomenon that, subsequent to the significant acceleration, the outflow of funds from banks slowed down in early 2012.

The national economy

Concurrently with trends in the net lending position of the Hungarian economy, an outflow of external funds also commenced, but this was not the case in each sector (Chart 8). Continued placement of deposits by households and the corporate sector as well as loan repayments in

[8] Securing foreign currency financing was in the vested interest of the banking system, because such helped control the B/S FX position, where the gap brought about by foreign currency lending to the domestic sectors started to widen.

Chart 8
Net lending of the individual sectors and the outflow of external funds
(as a proportion of GDP)



response to the crisis contributed significantly to a sharp rise in the private sector's net savings, enabling the banking system to increasingly downsize its external financing. By contrast, the net lending position of the corporate sector that had evolved did not entail a reduction in its direct external liabilities. As for the consolidated general government, the past few years have seen a rise in its borrowing demand and simultaneously, external borrowing has continued.

EXPECTED EXTERNAL BORROWING BY THE INDIVIDUAL SECTORS

Based on the forecasts presented in the *Inflation Report*, Hungary's net lending will continue to increase in the future (see the section on the financing capacity of the individual sectors). At the same time, the outflow of foreign funds may become more intense. In the following, we examine the likely changes in the external funds of the individual sectors over a time horizon until the end of 2013. In so doing, we continue to rely strongly on the forecasts presented in the *Inflation Report*.

In order to avoid any confusion, it should be noted that we had to rely on a number of assumptions in connection with the behaviour of the individual sectors when formulating our expectations for the future.

- The most important is that – similar to the past few years – we expect that the Government Debt Management Agency (GDMA) will issue foreign currency bonds to finance its expiring foreign currency loans and that, in line with the adopted practice, it will have foreign currencies converted into forints at the MNB.

- We also assume that the funds available to domestic banks will increase, with the amount of deposits from the private sector and that of loan repayments added to them.

- Finally, as regards the behaviour of banks, we rely on the historical wisdom that growth in the MNB bill portfolio will be absorbed mainly by domestic banks.

In light of the above, let us look at the changes that may occur in the dynamics of the external funds of the individual sectors.

In the context of net repayments by companies of the loans provided by domestic banks, we also expect a reduction in the external funds available to companies. Financial savings of the corporate sector are expected to rise further in the years to come in response to the launch of auto industry manufacturing, EU transfers and persistently subdued investment. Consistent improvement in the financial position of the sector is likely to materialise indirectly through the banking system (mostly through the repayment of loans, and in part through new placements of deposits) and directly in the processes of external finances. The latter may mean both foreign bank loans and the outflow of FDI liabilities, which became stuck at a certain level earlier (e.g. a marked reduction in intercompany loans).

Continued balance sheet adjustment by the banking system is also likely to still play an important role in the reduction in external funding. The expected rise in the MNB bill portfolio may reduce banks' net withdrawal of funds. The private sector's still sizeable net saving position means continued loan repayments and the placements of new deposits, which opens up another window of opportunity for a reduction in banks' net external funds. In addition to the savings of the private sector, banks' position vis-à-vis the central bank may also influence trends in banks' external funds. As mentioned above, along with a rise in FX reserves, there was a rise in the MNB bill portfolio (Chart 4), with the bills purchased mainly by banks. Thanks to the expected significant rise in EU transfers, central bank FX reserves may start rising again in the years to come (if the government takes on new foreign currency loans equal to those that mature). Simultaneously, banks' liquidity surplus is also likely to rise, which the banking system will have to finance. Banks' excess liquidity will go, in part, into the purchase of MNB bills and the repayment of external funds. While developments in the position of banks vis-à-vis the private sector could make a larger reduction in external funds possible, the expected rise in the MNB bill portfolio may put a brake on the outflow of banks' funds. All in all, compared to the past a smaller outflow of bank funds is expected to materialise by the end of 2013.

Along with moderation in the general government borrowing requirement, external borrowing by the state may also decline; by contrast, due to a rise in FX reserves, a net outflow of funds is likely to materialise at the level of general government consolidated with the MNB. Over the past few years, the volume of issuance of foreign currency bonds by the GDMA has been identical to the volume of maturing foreign currency debt; accordingly, we continue to assume that the government's net foreign currency borrowing will not entail net external borrowing. Simultaneously, domestic agents may play a greater role in financing the fiscal deficit, which is expected to be considerably lower than in 2011; in the first half of 2012, households and banks purchased Hungarian government securities in the amount of HUF 140 billion and HUF 240 billion, respectively. Overall, external borrowing by general government excluding the MNB may be lower this and next year than in 2011. Concurrently, the MNB's FX reserves may rise, which entails an outflow of funds. Taking the MNB's position vis-à-vis the rest of the world into account, we expect a net outflow of funds at the level of consolidated general government in the years to come, a development completely opposite to the inflow of funds that characterised the pre-crisis and the crisis years.

In addition to the baseline scenario outlined above, we wish to present two other scenarios in which the share of the individual sectors in the outflow of funds changes. *In one of the possible scenarios,* banks' holdings of MNB bills increase at a lower rate than in our assumption, which may be attributed to a number of factors: either banks are unwilling to hold liquid assets in such an amount or parent banks need the funds generated by their Hungarian subsidiary banks to a larger extent.[9] In either case, the outflow of banks' funds may be faster than what would follow from our assumption. An unusually rapid outflow of funds may also entail a rise in yields on government securities and a weaker forint, which, in turn, may result in changes in macroeconomic financial savings and the financial savings of the individual sectors. Based on historical wisdom, we think that lack of demand experienced by banks may be counterbalanced by the purchase of government securities and MNB bills by the rest of the world, which is also likely to be related to a shift in price-type variables. All in all, an increase in the government's external borrowing may counteract higher outflow of banks' funds. *In another possible scenario,* companies do not reduce their external liabilities despite the increase in their financial savings. In this case, liquidity arising from the saving position of the companies will flow into the banking system in the form of loan repayment or stronger placement of deposits. Banks will use these additional funds to reduce further their foreign debts, i.e. a lower outflow of corporate funds may be counterbalanced by a stronger outflow of banks' funds.

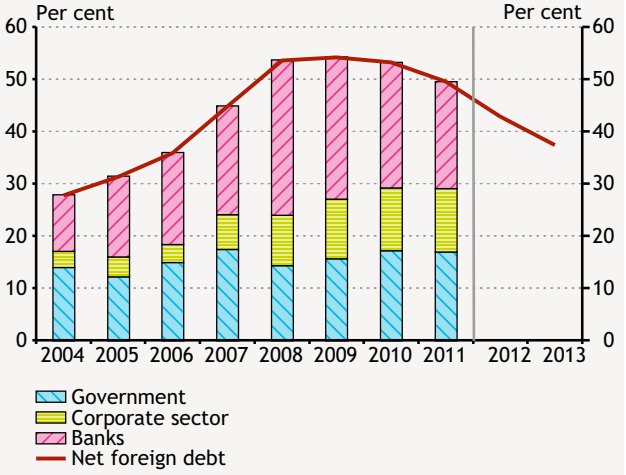
DEVELOPMENTS IN EXTERNAL DEBT

The sum of borrowing by the individual sectors (i.e. external financing capacity) determines the way in which a country's external debt changes. There are two types of external debt: debt liabilities (e.g. loans borrowed abroad and foreign currency bonds issued) and non-debt liabilities (e.g. direct investment and equity liabilities). Analyses focus mainly on external debt, as it carries roll-over risks, while equity-type external liabilities pose less risk to Hungary.

[9] If the government can only issue foreign currency bonds in an amount that is smaller than that of the maturing bonds, this would also result in a smaller portfolio of MNB bills held by banks. In such a situation, the government should increase the issuance of HUF. If the total amount of such additional securities were purchased by the banking system, then there would be no departure from the baseline scenario in respect of external borrowing. If, however, part of the securities were purchased by the rest of the world, then, *ceteris paribus,* banks' external borrowing could be lower relative to the baseline scenario.

Net external debt, which rose significantly before the crisis, has decreased only moderately, despite the significantly stronger net lending position. Hungary's net external debt started to rise sharply after 2004 and had exceeded 50 per cent of GDP by 2008. Such a marked rise was attributable to banks' external borrowing concurrently with a take-off in foreign currency lending and external borrowing by the corporate sector (Chart 9). Nevertheless, despite the economy's net lending position, net external debt did not decrease before 2011, which was due to a rise in the forint-denominated amount of external debt in response to the weakening of the forint. In 2011, however, despite further depreciation of the forint, GDP-proportionate net external debt fell tangibly, because the outflow of debt financing was particularly large.

Chart 9
Developments in net external debt



A consistently high external surplus means that, unless the exchange rate changes, debt indicators key to Hungary's external vulnerability will decline further. Hungary's external surplus approximates 8 per cent of GDP for 2012 and 2013 taken together. Thus, we expect an outflow of net external funds (debt and non-debt liabilities) of a similar size to occur in the next two years, i.e. the net external liabilities of the economy (debt and non-debt liabilities) is likely to decline to a similar extent. The likely underlying reasons for the outflow of funds are, to a lesser degree, a reduction in the FDI liabilities of companies and, to a larger degree, the net repayment of debt financing of the domestic sectors (companies, banks and the state). As regards the structure of financing, we expect a moderate inflow of non-debt financing in 2012, which may turn into an outflow in 2013. The underlying reason for this is that net savings of the corporate sector increase markedly, which may go hand in hand with a significant fall in intercompany loans. Thus, a reduction in external liabilities may materialise mainly through reduction in net external debt.

As an outcome of the improved external balance and along with the appreciation of the forint since in late 2011 and an increase in nominal GDP, Hungary's GDP-proportionate net external debt is likely to drop from 50 per cent as at end-2011 to below 40 per cent by end of 2013. Both net repayments of foreign loans (a gross reduction in debt) and an expected rise in foreign currency reserves (a gross increase in foreign assets) will contribute to a reduction in net external debt. The increase in FX reserves is due to EU transfers and the expected issuance of foreign currency bonds. By June, the appreciation of the forint early this year had led to an approximately 5 percentage point decline in the net external debt rate. Next year, unless the exchange rate of the forint changes, the reduction in net external debt indicators will depend mostly on the outflow of funds, which the impact from an increase in nominal GDP may accelerate slightly.

Despite net lending and more moderate debt indicators, the Hungarian economy is likely to remain financially vulnerable, because the gross borrowing requirement will remain significant, due to the economy's high indebtedness. Although the balance-of-payments surplus, the net saving position of the Hungarian economy and indicators of external debt, which have been decreasing consistently albeit slowly, mitigate the riskiness of Hungarian assets, gross data underlying the net figures should not be neglected, as net lending reduces Hungary's gross borrowing only to a limited extent. As regards short-term funds, economic agents have to roll over funds in an amount of around EUR 30 billion each year, the execution of which will likely continue to pose risks.

SUMMARY

Prior to the crisis, Hungary borrowed heavily as a combined result of investment and consumption exceeding the incomes of domestic agents and lax fiscal policy. In response to the crisis, the net savings of the domestic sectors rose substantially, while the borrowing possibilities for banks and companies were fewer, which ultimately led to an outflow of funds. Our analysis reveals that not all the sectors strive to repay external debt: in the context of a significant outflow of funds from the banking system, there was no material change in the external funds held by companies, whereas by contrast, the general government sector continues to borrow. Our forecast reveals that changes in the outflow of funds from the individual sectors are likely to occur in the years to come. The underlying reasons for this are that there may be some slowdown in the reduction of banks' external

funds in response to the expected increase in holdings of MNB bills and that an outflow of funds may materialise at the level of consolidated general government as well. Its extent depends heavily on the possibilities available to banks for withdrawing funds and on their intention to do so. If parent banks decide to withdraw further funds or FX reserves grow only modestly, the government is likely to borrow further. Concurrently with the possible outflow of a larger volume of funds, Hungary's net external debt may fall faster than it used to.

Zoltán Szalai: A crisis of crisis management? Debates over fiscal adjustments in the European Monetary Union

In response to increasing market pressure, EMU countries embarked on a robust consolidation process in 2010 in order to reduce their fiscal deficits and sovereign debt levels. Although – relying on external help in a number of cases – they have been implementing aggressive adjustment programmes, their public debt-to-GDP ratio is unlikely to change or change very much this or next year. Consequently, a debate has evolved over the effectiveness of fiscal tightening.

INTRODUCTION

The financial crisis which emerged in 2007 and intensified in 2008 spread from the US to other regions, including the Economic and Monetary Union (EMU). Terms of financing changed significantly, credit risk premia rose dramatically and lending declined. Although the European Monetary Union as a whole is less indebted than other global regions, it has become the riskiest region since the outbreak of the Greek crisis at the end of 2009. In earlier MNB publications, we have discussed the (mainly institutional) deficiencies which can explain this apparent contradiction.[1] This article attempts to provide a brief overview of the debates related to the success of crisis management in Europe and, within that, the effectiveness of fiscal consolidation.

THE GLOBAL CREDIT CRISIS AND THE RESPONSE OF THE EUROPEAN MONETARY UNION

In response to the deteriorating global macroeconomic situation, after the G-20 summit in Washington in the autumn of 2008,[2] governments and central banks intervened decisively to put an end to developments which threatened to lead to general panic. On a number of occasions, they resorted to unconventional economic policy tools only used during crisis periods. As for fiscal policy, they adopted the European Economic Recovery Plan (EERP), which enabled governments to swiftly mitigate the consequences of the crisis and put their respective economies back on a growth path by means of country-specific fiscal measures which could handle the crisis, temporarily 'suspending' the strict fiscal regulations designed for 'normal times'. As an independent institution, but working in unison with the governments, the European Central Bank (ECB) resorted to non-standard tools to prevent financial panic from leading to the collapse of the banking system.

From 2009 onwards, when the first signs of global economic stabilisation were discernible, policymakers in the developed countries began considering the possibility of gradually abandoning non-standard measures. In September 2009, the G20 decided to implement a 'back-to-normal' process in a concerted, but country-specific manner.[3] However, encouraged by the results of immediate crisis management, the individual global regions soon started to increasingly diverge in terms of economic policy priorities. Europeans, who were especially worried about their fiscal deficit and sovereign debt, which were inconsistent with the operating principles of the EMU, decided to embark on a path of fiscal consolidation. This intention became stronger with the outbreak of a fiscal crisis in Greece at the end of 2009 and mounting financial market tensions in the other periphery countries. Whilst also seeking ways 'normalise' conditions, other major advanced regions, primarily the US and Japan, were more cautious about launching the process of fiscal consolidation.

Since the second half of 2011, fears of another recession have become more pronounced. The European Monetary

[1] For a more detailed discussion of the global crisis, see MNB (2011).

[2] G20 was expressly founded to manage the global crisis in a co-ordinated manner. The rationale for this was that it became clear in the crisis that major developing countries were not represented in a manner that is commensurate with their weight within the current global institutional framework.

[3] G-20 (2009) Pittsburgh Summit: Framework for Strong, Sustainable and Balanced Growth

Union has become the most important risk to global economic stability. Fiscal consolidation in the EU member states under market pressure has resulted in little improvement and other larger member states have also come under pressure. The looming possibility of another recession also calls into question the sustainability of fiscal policies. Accordingly, a debate on the following issues has erupted again: *Is fiscal tightening a reasonable solution when, due to balance sheet adjustments, the private sector's propensity to save is much stronger than it used to be and when growth is fragile? Is there any likelihood that such a policy results in an unintended outcome of GDP falling so steeply that debt either cannot be reduced or even rises to a level that is higher than before the tightening? Or, on the contrary, is fiscal policy supposed to help the private sector with balance sheet adjustments by allowing the deficit to grow further? Is this a feasible policy in those countries where sovereign debt is already high? Why should markets assume this additional risk if there are investments that carry lower credit risks?*

Neither the aggregate debt nor the fiscal deficit of the EMU countries explains Europe's eagerness to implement speedy fiscal consolidation: the corresponding indicators for both the US and Japan are worse. Nevertheless, in respect of the EMU member states, Ireland, Greece, Spain and Portugal will need to make more marked fiscal adjustment than the US or Japan.

Before the crisis, yields on government securities in Greece and other countries which later came under market pressure hardly featured any risk premium in excess of German yields which were seen as a safe investment. A sovereign default by an advanced country has not been a serious possibility since the end of WW II. Therefore, the government securities of such countries were considered to be practically default risk free and were held by many investors which were allowed to hold only a limited number of risky securities (e.g. pension funds, certain investment funds and central banks such as the ECB). However, when fears that sovereign debt in Greece and other EMU countries is not as risk free as in Germany, as these countries may not necessarily be bailed out by other member states if faced with repayment difficulties, markets started to take a closer look at the sustainability of their debt.

The renewed appearance of sovereign default risk in advanced economies had a profound impact on Greek government securities, which also spread to the government securities markets of countries facing high debts for other reasons (e.g. Ireland, Portugal, Spain, Italy and Cyprus, etc.). The underlying reasons for the indebtedness of these countries vary and so does their macro-economic situation. The common denominator is that yields on their government securities reached levels that called into question the sustainability of their debt and several of them had to resort to external help. Fears developed that deposits in the individual countries were also risky to varying degrees. As a result, a flight to safety soon ensued, with deposits flowing out from periphery countries into the strongest member states. Speculation emerged about sovereign defaults and bank bankruptcies, with the threat of becoming self-fulfilling prophecies, and the individual periphery countries were unable to manage these problems on their own.[4] *In light of the uncertainty that had evolved, member states in a stronger fiscal position concluded that further rapid fiscal consolidation in all countries was the only viable solution to restore market confidence and to prevent panic about a disintegration of EMU.* Accordingly, the condition for a bail-out to be met by each crisis-stricken country was stringent fiscal adjustment.

This article presents the debate over fiscal adjustment in connection with Greece, Ireland, Spain, Italy and Portugal (EMU 5). The situations in all of these countries are not the same: for example, Greece has already received several bail-out packages and been granted debt relief, whilst Italy is not in a crisis yet, but can only access financing at unsustainably high yields. What they have in common is that they are both a risk to the stability of the EMU as a whole, due to either the size of their economies alone or the potential contagion risks.[5]

FISCAL ADJUSTMENT AND THE SUSTAINABILITY OF DEBT

The outlook for a slowdown in the global economy – which first emerged in 2011 and then became more definite from the summer of 2012 – points to an even more unfavourable fiscal path in the GMU-5 countries, compared to the earlier forecasts. Especially in light of their longer-term growth

[4] See De Grauwe (2011), who provides evidence that even if Spain's debt is lower than that of the UK, its sovereign default risk indicator is much higher. He attributes this contradiction to the fact that neither Spain nor the other EMU member states enjoy monetary independence, and markets fear that the common central bank will not intervene in their respective government securities markets if a market failure materialises (market maker of last resort).

[5] Slovenia found itself under similar pressure for a while, but its growth prospects have improved and its sovereign debt is not too high either. Cyprus turned to the IMF for help in the summer of 2012. Given that these two countries are relatively small and that their problems are less serious, they attract less attention in respect of the stability of the EMU as a whole.

Table 1
Indicators of the sustainability of sovereign debt in five EMU countries

	2008	2009	2010	2011	2012*	2013*
Greece						
GDP growth	−0.1	−3.3	−3.5	−6.9	−4.8	
Debt rate	113	129	145	165	163	
Yields on government securities	7.4	5.7	8.2			
PSB**		−9.6	−3.4	1.2	3.4	1.9
Ireland						
GDP growth	−3	−0.7	−0.4	0.7	0.5	1.9
Debt rate	24.4	42.2	74.9	96.4	105.6	109.5
Yields on government securities	4.4	4.9	9.2	8.5	6.9	
PSB		−7.6	−6.5	−4.9	−4.1	−2.4
Italy						
GDP growth	−1.2	−5.5	1.8	0.4	−1.9	−0.3
Debt rate	105.8	116.1	118.1	120.1	125.8	126.4
Yields on government securities	4.5	4.1	4.8	5		
PSB		0.7	1	1.3	4.7	5.5
Spain						
GDP growth	0.9	−3.7	−0.1	0.7	−1.5	−0.6
Debt rate	40.2	53.9	61.6	68.5	90.3	96.5
Yields on government securities	4.4	4	4.3	5.5	7.1	
PSB		−6.9	−5.4	−4.9	−1.6	−1.5
Portugal						
GDP	0	−2.9	1.4	−1.6	−3.3	0.3
Debt	71.6	83.1	93.4	107.2	112.4	115.3
Yields on government securities	4.5	4.2	5.4	10.1	11.7	8
PSB		−5.8	−5.6	−2.3	1.8	3.7

** IMF forecast.*
*** Primary structural balance.*
Source: IMF (2012b, 2012c, 2012d, 2012e, 2012f).

potential, debt in these countries seems unsustainable. Market conditions for borrowing by them make this obvious; it follows then that fiscal adjustment is inevitable in these countries. There are debates about the ways in which GMU-5 countries should respond to the bleaker outlook: should they introduce further austerity measures to maintain the previously designated fiscal path or would doing so result in further burdens on economic agents to the degree that they cannot or will not bear such burdens? Or, in an even bleaker scenario, would the adoption of such measures backfire and lead to an outcome that is just the opposite of what is intended, due to its disproportionately adverse impact on business activity?

In order to be able to answer these questions, we need to know how a reduction in budgetary expenditure affects growth in terms of its size and composition. This impact depends on the value of multipliers. The influence of fiscal tightening on the 'snowball effect' must also be assessed (See Box 1).

Box 1
Fiscal balance, economic growth and cycles

Fiscal balance and economic growth interact via a number of channels.

$$D(t) = D(t-1)*(1-G(t))-E(t) = D(t-1)*(1+R(t)-G(t))-EE(t)$$

In the formula, *D* denotes the debt-to-GDP ratio, *G* is the rate of nominal growth, *R* stands for the average rate of interest on sovereign debt and *EE* is the primary fiscal balance. The formula describing annual dynamics reveals that, fundamentally, trends in debt are shaped by the *primary structural balance and the snowball effect*.

There may also be instances of revaluation, e.g. the revaluation impact of exchange rate changes or one-off transfers such as the take-over of the assets of the private sector; however, they are not fiscal adjustment items and are, in part, exogenous attributes as far as consolidation is concerned. The budgeting process also takes into account these changes that are beyond control.

The *primary balance* is the recorded fiscal balance minus interest payments, which reveals more about trends in fiscal policy, because interest payments are subject to past indebtedness and market interest rates, with the latter two left unaffected by current economic policy. The *structural primary balance* shows what the balance would be if tax bases were at their medium-term levels. Thus, from this point of view, medium-term economic performance, i.e. potential GDP, is of key importance.

The primary balance should cover current interest payment obligations if debt were to remain sustainable. As the primary balance changes in conjunction with long-term growth and interest depends on government securities market yields, the primary balance should be higher than debt, i.e. the snowball effect (the difference between interest on debt and the growth rate of the economy).

Snowball effect means that if the primary balance is in equilibrium, and the debt-to-GDP ratio is exactly 100 per cent, then if growth is lower than interest rates, debt grows and cannot be sustained. It follows then that a surplus is needed to stop the snowball.

Table 1 shows the trends and developments in the variables key to sustainability in the countries under market pressure: due to the rate of growth and interest on debt – i.e. the snowball effect – the sustainability of their debt is in question. The debt-to-GDP ratio is unlikely to decrease this year and next year due to high risk premia and the deteriorating growth outlook. This is attributable, in part, to short-term multiplier effects, which, in response to fiscal consolidation, trigger a more marked fall in growth than the extent of the improvement in the fiscal balance.[6] They also reflect market uncertainty about the success of consolidation, which, in turn, leads to high yields on government securities.

Box 2
Assessments of fiscal multipliers

The European Commission's 2012 *Report on Public Finances in EMU* provides a useful and exhaustive summary of the assessment of fiscal multipliers. Multipliers show how a unit change in the fiscal balance affects output. If the relationship is in the positive domain, the direction of the change in both is identical: if the deficit decreases, then GDP declines as well; if the multiplier is higher than one, then GDP will fall to a greater extent than the deficit. As a rule, the interpretation is symmetrical, i.e. an increase in deficit will raise output. Non-Keynesian effects materialise if there is an inverse relationship in the negative domain, when a change in the deficit results in an increase in output; this can counterbalance the adverse impact of weaker demand by favourably influencing long-term interest rates. If non-Keynesian effects are dominant, fiscal consolidation does not result in growth sacrifice: fiscal stabilisation results in an increase in output; by contrast, when classic Keynesian effects are dominant, there is, at least for a temporary period of time, growth sacrifice. There are also expenditure and revenue-side multipliers, and the impact of the individual items also varies.

[6] European Commission (2012), pp. 138–144.

Research shows that the value of multipliers depends on a number of factors. Impacts are stronger if an economy is closed, i.e. there is no 'import leakage', consolidation is consistent and lasting, and economic policy is credible, etc. There may be a difference between the impact of multipliers in the first year and in subsequent years (persistence). Given the context of the current crisis, it is especially important that the impact of multipliers varies to a large degree depending on the prevailing phase of the business cycle. If the proportion of unused capacities is high, so is the impact. This also works symmetrically: in theory, consolidation reduces output to a large extent, while expansion boosts it even more markedly, relative to non-crisis periods.

Estimates in studies range rather widely: In non-crisis periods, expenditure multipliers range between 0.4 and 1.2, with tax multipliers showing a somewhat lower value (often below 0.7). In crises, especially in financial ones, they usually stand at 1.4 or even 1.6. The European Commission's own estimate also corroborates these values. Results vary considerably from one country to the next; however, this is attributable to not only the different characteristics of the individual countries, but also to the uncertainties of the estimates.

In light of such uncertainties, the values of a *critical multiplier* serving as a benchmark have also been calculated. These threshold values are the values of the multiplier where, at any given level of interest rates and debts, fiscal consolidation will increase debt in the first year. This indicator depends on the original amount of debt, the flexibility of the fiscal balance to trends in growth, which weakens the ability of consolidation to reduce deficit, and the value of the multiplier itself. If debt-to-income ratio is 100 per cent, then, with automatic stabilisers standing at 0.5, the value of the critical multiplier is around 0.6 to 0.7.

The Commission calculated critical multiplier values for 27 member states, with the values ranging between 0.5 (Greece) and 2.8 (Estonia). A comparison of these threshold values with the estimates in empirical literature reveals that figures for Greece are unequivocally critical already in normal times. If the values are higher as is the case in crises, in the Commission's judgement, the multiplier is expected to reach the critical value in around two-thirds of the member states; accordingly, consolidation will result in higher debt in the first year. The EMU countries that are the hardest hit by the crisis are in this group.

Table 2
Critical first-year multipliers in the context of unchanged 2011 interest rates

Greece	0.5
Ireland	0.7
Italy	0.6
Portugal	0.7
Spain	0.9

In simulations of debt sustainability, subsequent to a short-term increase in debt in response to consolidation, sustainability can be restored in two or three years, i.e. debt either stops growing or starts declining. The same factors explain medium- and longer term developments in debt as short-term ones except that, over these horizons, the debt-reducing impact of consolidation is dominant in terms of its adverse influence on GDP (denominator effect).

However, simulations cannot take into account a few important impacts, because such effects cannot be quantified to a satisfactory degree. Under certain circumstances, these impacts can trigger an effect that runs counter to the one intended by consolidation. One such impact is when the multiplier is persistent, i.e. its impact continues for several years. This can be the case if consolidation fails even after a number of attempts. With its size and direction depending on a number of factors, the impact on interest rates is of key importance. Consolidation is a primary source of impact through reduction in deficit and debt. As these impacts also influence GDP, interest rates also reflect the expectations that are the outcome of these interactions. In other words, interest rates reflect market expectations regarding the success of consolidation. A scenario where expectations foil consolidation cannot be ruled out either. If, for instance, significant long-term adjustments are needed, markets expect societies to resist austerity measures and governments give in. Another possibility is that planned consolidation is implemented, but GDP falls to a larger-than-expected extent and consolidation has to be repeated.

DEBATES OVER CRISIS MANAGEMENT

The relationships described above facilitate the interpretation of debates over crisis management. Some recommend that, in response to deteriorating growth prospects, the countries affected should implement consolidation in a *protracted* manner. Fiscal tightening along with excessive saving by the private sector would increase the *economic downturn* disproportionately and unnecessarily. This recommendation seems to push at an open door, because the new economic co-ordination framework accords higher importance to the structural

balance, of all the fiscal policy objectives.[7] This means that if there is an adopted fiscal path and a related growth path, then, if the latter turns out unfavourably, no further consolidation measures need to be taken automatically. It follows then that it is the cyclically adjusted balance rather than the headline deficit that needs to be maintained; the former may be higher than the original fiscal objective calculated for higher GDP as is the case in the example that we offer. This is, however, not automatically done, as the consent of the counterparties and the Commission needs to be obtained.

Agreement with counterparties can improve credibility as perceived by the markets and mitigate the threat that a modified objective may rule out the possibility of a *less painful adjustment* through increased interest and the mass withdrawal of deposits. There have been a number of instances consolidations slowing down recently. In July 2012, Spain was given the following relief in light of deteriorating growth prospects: the Spanish government was allowed to postpone reducing the deficit to below 3 per cent by one year until 2014. Similarly, in Portugal the new deficit target allows a 0.5 percentage point larger deficit in 2012 and a 1.5 percentage point larger deficit next year. In the past, Greece had also been granted similar relief. In fact, there seems to be agreement on this issue; the question is when relief should be granted and to which countries.

Other proposals seek to manage the *'denominator effect'*, i.e. *growth*. Those in favour of fast consolidation wish to improve the longer-term growth prospects of the countries via fiscal and other austerity measures. In their opinion, one important factor threatening long-term growth is excessively high government debts, which, once they have reached a certain level, reduce or even hinder growth. By contrast, those arguing for slower consolidation are also afraid that longer-term growth may also fall victim to a shorter-term downturn: referring to what is called hysteresis, they worry that downturn may lead to a marked loss in output and capacity, leading to a permanent deterioration in potential growth.

Closely related to this are debates over *structural* (product and labour market) *reforms*. Those in favour of fast consolidation argue that the crisis should be turned into an advantage. Reforms that would hardly be accepted by stakeholders under other circumstances should be implemented and governments themselves would also be unwilling to adopt unpopular measures ('Let's not waste a perfectly good crisis.'). Those against the idea argue that reforms make stakeholders even more wary and, hence, urge them to save more heavily and postpone capital investments in economies that are already suffering from slack demand. In the absence of demand, boosting supply and competition cannot succeed. In a dynamically growing economy, losers of reforms can be compensated for the losses that they suffer, which helps reforms gain acceptance and makes it easier to manage the impacts that put a brake on growth.

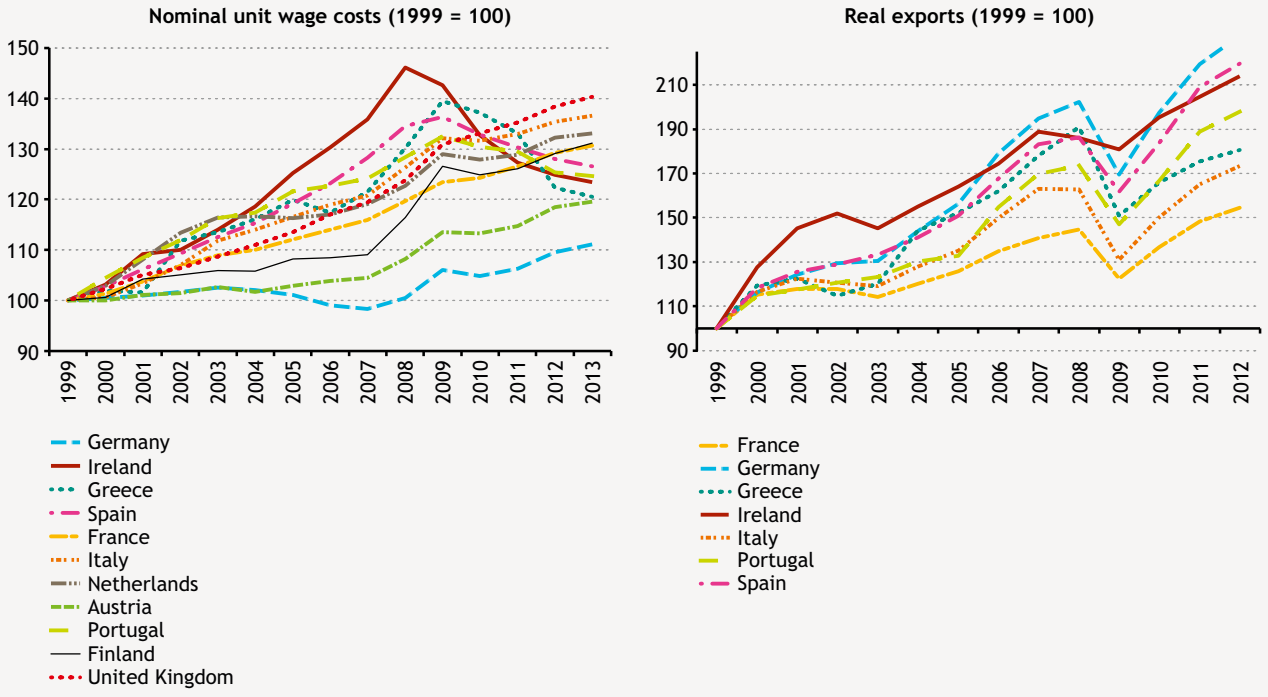
Another even more intriguing debate is being held about the competitiveness of indebted countries. According to the most widely held view, the problem of the indebted countries is that their competitiveness is weak, which cannot be remedied through depreciation due to the common currency. This raises the issue in both the longer and the shorter run, as to whether satisfactory performance can be achieved within EMU. Others doubt that, except for Greece, there is anything the matter with competitiveness. In their opinion, competitiveness in the EMU-5 countries is unlikely to have deteriorated before or during the crisis, as wage competitiveness and export sales were similar to those in the rest of the EMU member states.[8] This is shown in the two graphs in Chart 1. Competitiveness is relative: the chart reveals that there is 'overcompetitiveness' in Germany rather than a blatant lack of competitiveness in the crisis countries. If, however, the opinion that the EMU-5 countries are uncompetitive gains ground, then this may become a self-fulfilling prophecy in the form of higher prevailing interest rates and may make the establishment and operation of a sustainable debt path difficult.

A number of analysts claim that indebtedness and, within that, the indebtedness of the private sector offer a more plausible explanation for overheating and the absence of external equilibrium in the EMU countries, although fiscal deficit was a more important contributor in Greece[9] (see Chart 2).

According to this opinion, austerity measures and fighting overheating would have made sense in the pre-crisis period. Therefore, the European Commission, the ECB and the European Council have worked out a group of macro-economic indicators, on the basis of which they may, in the future, for preventive purposes, stipulate macro-economic

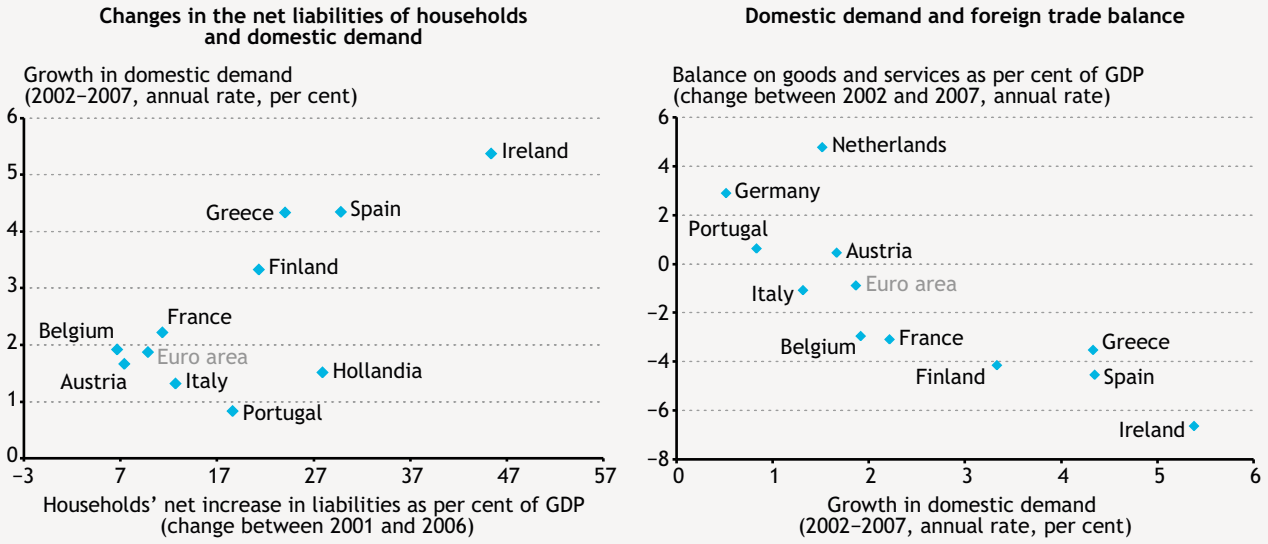
[7] Buti and Pench (2012a, 2012b).
[8] See, e.g. Fatás (2011).
[9] See, e.g. Brender et al. (2012).

Chart 1
Competitiveness indicators



Sources: AMECO, Eurostat.

Chart 2
Components of domestic demand



Sources: AMECO, Eurostat.

adjustments for the countries where they detect and identify unsustainable processes.[10] However, austerity measures presently fail to achieve their objectives, because they only make the situation of an already adjusting private sector even worse by putting a brake on the output potential of the economy and may even lead to mass bankruptcies.[11]

At this juncture, we have returned to the issue of a major deficiency in the institutional framework of the EMU/EU.

[10] In response to the crisis, the European Commission has adopted a scoreboard. Based on this, the potential macro-economic vulnerability as well as the internal and external imbalances of the member states are checked starting from 2012.

[11] See, e.g. Koo (2012).

EMU is a monetary region in which – although the member states have discretion over their respective fiscal policies, restricted by certain regulations as the case may be – they have lost their monetary independence. In other words, monetary sovereignty has been fully centralised, as a result of which the participating countries relate to their own currency as if it were a foreign currency. This explains why markets perceive the sovereign default risk in Spain higher than that of the much more heavily indebted UK.[12] Due to the current mode of operation of the ECB, weaker EMU participants are faced with a situation that is similar to that of the non-participating countries, which raised debt in euro or other foreign currencies rather than their own sovereign currency.

The large degree of integration in the financial sector failed to be followed by the integration of fiscal policy to a corresponding extent. Therefore, some of the recommendations for institutional changes are focussed on balancing out this asymmetric integration and urge *community* rather than national *solutions*. A higher level of co-ordination in fiscal stimuli would be achieved, if aggregate demand were redistributed within the EMU. In such an arrangement, countries with greater room for manoeuvre would ease their fiscal policy or at least slow down consolidation. They could help the countries that have to implement consolidation faster by serving as export markets for them.

Another more centralised solution is *increasing aggregate demand* via the EIB (European Investment Bank). Expenditures could target increasing the growth potential of less competitive countries, e.g. infrastructure development. Others claim that in order to handle high unemployment at the same time, activities *capable of creating a large number of jobs* at any unit cost should be financed; infrastructure development is not among them, because too large a proportion of expenses is allocated to

Table 3
Fiscal adjustments: a summary of pros and cons

Austerity measures and resultant impacts	Pros	Cons
Short-term decline in GDP	Probable, but inevitable. Growth soon returns (1 or 2 years).	The private sector already saves heavily, as a result of which the fiscal multiplier is higher and the resultant sacrifice is greater.
Impact on yields on government securities	Only austerity measures can convince the markets. Credible tightening brings down yields to a sustainable level.	Markets only think short term and soon start panicking. The short-term growth impact may deteriorate how sustainability is perceived. Investments flow out of the countries experiencing protracted weakness.
Longer-term growth	No or no significant adverse impact. Reduction in debt and lower interest rates help long-term growth.	Unnecessarily permanent loss in output and capacity (capital and labour). If growth can be contained, then both debt burden and the amount of the debt start to reduce steadily.
Necessary, albeit unpopular, reforms	Market pressure may also help governments implement such structural reforms that they would not dare/want to but for the crisis (theory of 'good crisis').	Crises are not the best time for carry out reforms – as a rule, it is easier to compensate losers for their losses if the economy grows. Their short-term impact on GDP amplifies negative feedback.
Encouragement and EMU participation	The EMU functions well if all adopt a stability-oriented policy. This must be corroborated – otherwise lack of discipline re-emerges.	It is not lack of discipline that led to the current crisis. The scoreboard will prevent imbalances in the future. Extinguishing fire is not the right time to find and preach to the 'culprits'. Fire must be extinguished first.
Balance sheet crisis/competitiveness	Improved competitiveness is one of the conditions for recovery from crises even if underlying reasons for the evolvement of the crisis were different, e.g. build-up of external debt and excessive domestic consumption.	Competitiveness is a must; however, wage competitiveness does not always help faster growth. This may emerge at each other's expense within the EU. During balance sheet crises income must be stabilised because of tax burdens; internal depreciation may backfire.

[12] De Grauwe (2011). For the avoidance of doubt, it should be added that this is not completely analogous with the case of foreign currencies. As regards distressed countries, the ECB could also act in the same way as did the respective central banks of the USA or the UK. This is a selected mode of operation, which can be changed. A number of proposals aim at just this.

capital goods.[13] IMF analysts[14] claim that even structural reforms would be easier to implement if fiscal policies were supportive.

Various forms of debt relief (e.g. partial debt forgiveness and restructuring) entail greater sacrifices and solidarity. We have already seen an example of this kind when an agreement was reached with private creditors to cancel part of the Greek debt. This, however, can hardly be a solution in large countries with sizeable debts. The only way out for them is to render debt sustainable by restoring growth and to reduce debt servicing burdens by mitigating risk premia. The most recent recommendations that look to the ECB for reducing yields on government securities may help prevent the panic that emerges during the downturn in the first phase of consolidation and gain some time. That said, a viable solution should come in the form of further community measures.

SUMMARY

So far, crisis management has failed to restore the eroded confidence in the sustainability of the fiscal situation in some countries. There seems to be a consensus that consolidation in the current crisis situation is leading to a serious economic downturn at least over the short term, i.e. on a one- to three-year horizon. The underlying reason for this is that too many participants strive to make adjustments concurrently, the aggregate result of which is weak economic performance. The problem is that the countries that are the most in need of fiscal adjustment have the least room for reducing the costs of consolidation. Furthermore, wary of contagion and strongly risk averse, even the participants that, in theory, have room for manoeuvre opt for tightening. Some propose that in order to find a solution to the crisis, and for market stress to be eased, balance sheet adjustment should be facilitated through proper coordination, and such a solution would also benefit net lenders. This strategy also carries risk, however; therefore, countries in a stronger position show little willingness to adopt it. As long as markets see certain countries teetering on the verge of default, while others are true safe havens, capital flows will reinforce this chasm. Therefore, in order to resolve this situation, we need to stabilise market expectations permanently, dispel fears of the disintegration of the EMU and demonstrate growth potential.

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[13] E.g. Tcherneva (2008, 2012).
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Stepanchuk Serhiy[1]: 11th Annual Macroeconomic Policy Research Workshop at MNB: Microeconomic Behavior and its Macroeconomic Implications During the Financial Crisis

On September 6-7, 2012, the Magyar Nemzeti Bank hosted the 11th Macroeconomic Research Workshop organized jointly with the CEPR. The title of the workshop was 'Microeconomic Behavior and its Macroeconomic Implications During the Financial Crisis'. The event was highly topical, as the policymakers try to understand the impact of the financial crisis on different economic agents and tailor their response to it. The keynote speakers of the event were professors Christopher D. Carroll (Johns Hopkins University) and Matthew D. Shapiro (University of Michigan), who are well-renowned for their work which establishes the importance of agent heterogeneity and microeconomic behavior for macroeconomic outcomes. The event brought together researchers from both the academia and policymaking institutions, who presented their thought-provoking research which both empirically documented the importance of agent heterogeneity, and attempted to theoretically model its aggregate implications in the corporate, housing, banking sectors and labor markets.

This article provides a summary of some of the lessons from the workshop, focusing in particular on reviewing the contributions by the keynote speakers and the papers presented at the workshop.

MACROECONOMIC IMPLICATIONS OF MICRO-LEVEL HETEROGENEITY

Professor Christopher Carroll dedicated his keynote speech to illustrating and stressing the importance of agent heterogeneity in macroeconomic modelling. To motivate his talk, he started with recalling his experience of presenting the standard representative-agent based DSGE models to the members of the Federal Open Market Committee (FOMC), who met them with significant scepticism. One of the policymakers' biggest concern (which Professor Carroll fully shares) was the way these models approach uncertainly. This is quite understandable – policymakers face uncertainty about the potential impact of their decisions on the economy on a daily basis, and this has become especially important during the financial crisis. Uncertainty also often affects the behavior of consumers, firms, banks, financial markets and countries, which became especially apparent during the current sovereign debt crisis. At the same time, standard representative-agent based DSGE models treat uncertainty in a very rudimentary and unrealistic fashion. Uncertainty is introduced into these models as either a sudden universal decline in economy-wide technological efficiency, as an arbitrary change in the representative agent's patience, or as a monetary policy shock which Professor Carroll referred to as 'monetary-policy-makers gone wild'. In addition to the lack of realism, the magnitude of these shocks is too small. In the micro-level data, the variance of the household-specific shocks is many times bigger than the variance of the shocks used in these models.

Professor Carroll believes that one of the big advantages of modelling agent heterogeneity explicitly is the availability of large micro level datasets which can be used to estimate and empirically test such models. This is in sharp contrast to the models with a representative agent which have to rely on aggregate-level data. As an example, Professor Carroll used the recent heated debate between Professor John Taylor (Stanford University) and Moody's Analytics chief economist Mark Zandi (and, more broadly, between the supporters of the Republican and Democratic parties in

[1] The text was edited by Ádám Reiff (MNB).

the US in general) about the possible effects of the Republican proposal to cut government spending on the US economy. According to John Taylor, such cuts, by improving the fiscal situation in the US, would reduce private sector's uncertainty about the possible future tax increases, and thus stimulate private spending and investment. Mark Zandi, on the other hand, does not think that these considerations play a big role for private sector agents, and predicts that the proposed spending cuts will have significant negative effect on aggregate demand, employment and output. Professor Carroll pointed out that, unfortunately, there is little hope of finding empirical support for either of the two views, since one would have to essentially rely on a single data point – the effect of the 2009 stimulus package on the US economy.

Next, Professor Carroll turned to comparing the predictions of the representative agent based DSGE models and macroeconomic models that explicitly address consumer heterogeneity about the marginal propensity of consume (MPC). MPC is important both for the economists and for the policymakers for a number of reasons. First, it relates to consumers' risk aversion, and hence influences their portfolio choice. This is of particular significance and interest during the financial and sovereign debt crises, when dwindling investors' appetite for risk may contribute to a drop in asset prices and increased interest rates for risky sovereign debt. Second, MPC related to consumers' labor supply decisions and intertemporal choices. Finally, it is of special interest for policymakers who try to decide on the effectiveness of the fiscal stimulus measures, since it determines how much of the additional income will be spent and how much of it will be saved. Empirical studies usually have found that MPC, measured as a change in consumption spending over a year in response to a surprise extra \$1 of income, lies somewhere between 0.2 and 0.7. However, a typical representative-agent based DSGE model which disregards wealth and preference heterogeneity, potential impact of borrowing constraints on less wealthy consumers, and confronts the representative agent with small aggregate-level income shocks usually implies that MPC is much smaller, between 0.02 and 0.05.

The solutions proposed in the literature that try to change the predictions of the representative-agent based models are far from satisfactory. The one proposed by Campbell and Mankiw (1989), who suggested adding some arbitrary fraction of the so-called 'hand-to-mouth' consumers, and assumed that this fraction earns 50 per cent of the economy's total income, has many drawbacks. It is rather ad hoc, and it fails to match the micro-level data, where only 10 per cent of households have zero wealth. In addition, it fails to address the potential effects of credit and uncertainty, as they are irrelevant for both groups of consumers in this model, while these questions are of particular interest to policymakers. Another proposed solution – adding habit formation to the representative agent's utility, moves the model's predictions in the wrong direction, since in this case, one obtains the MPC of less then 0.01. As a result, Professor Carroll argues that one should not try to rationalize the behavior of the economy-wide aggregates with the choices made by a single agent.

Instead, Professor Carroll proposes to use the models that treat agents' heterogeneity explicitly, and follow the following approach:

- calibrate income uncertainty using household-level data;
- solve for optimal consumption behavior given preferences;
- simulate to generate wealth distribution;
- calibrate *ex ante* heterogeneity (in preferences, age, expected income growth, mortality risk) to match wealth distribution.

With the progress made recently in the development of numerical algorithms designed to solve such problems, and the rapid advancement of the computer hardware tools, this approach becomes increasingly feasible. Professor Carroll believes that this approach can deliver more plausible, understandable and informative answers for policymakers, and should eventually replace the 'representative agent' paradigm in macroeconomics.

DIFFERENTIAL IMPACT OF THE FINANCIAL CRISIS ON ECONOMIC AGENTS: EMPIRICAL EVIDENCE

There are important differences in the way the financial crisis has affected various economic agents. Professor Matthew Shapiro (University of Michigan) used his keynote speech to present his recent thought-provoking research in which he investigates the impact of the financial crisis on the well-being of older Americans. He finds large heterogeneity both in the impact of the financial crisis on this population group, and in their capacity to absorb it. In this research, Professor Shapiro relies on the data collected in the two waves of the Cognitive Economic Study (CogEcon), a survey conducted by the University of Michigan. This study provides baseline wealth measurements and very detailed information about the structure of households' portfolios for a representative sample of US individuals aged 50 years and older, and in addition, has a wide range of preference and cognition measures, including measures

of risk preference, expectations, financial knowledge and attitudes, and cognitive status, that should partially determine households' portfolio choices. The two waves of the CogEcon study provide a unique insight into the impact of the crisis on this group of Americans because of their timing. The first wave has been completed shortly before the financial crisis that began in the fall of 2008. The second wave was fielded in early summer of 2009. It re-measures some of the first wave's variables, but also contains many questions that assess the changes in circumstances, attitudes and plans that followed from the financial crisis.

The financial crisis had a negative impact on the stock market, directly affecting the stockholders. Higher wealth households on average have greater exposure to the stock market, and consequently have experienced greater wealth losses during the crisis. Professor Shapiro finds a positive relationship between cognitive skills among the people in his sample and both their wealth and their exposure to the stock market. Hence, he finds that on average people with high cognitive skills experienced larger financial losses due to stock market decline during the financial crisis.

At the same time, he finds that those who displayed higher cognitive skills appeared to be better able to deal with the effect of the crisis. People with low cognitive skills were more likely to have experienced some form of financial stress – having late payments on a loan, being denied credit, losing a home or a property due to a bank foreclosure etc. To some extend, this can be accounted by the fact that those with low cognitive skills were more likely to have low wealth, and thus lacked a financial buffer.

Interestingly, financial crisis had a non-monotonic effect on the plans to postpone the retirement for people with different starting wealth. The mean increase in reported planned work years was 1.32. The response was greater for those with greater capital losses from the crises (typically, the people with larger starting wealth). However, those with no wealth showed as big a mean increase in years worked as those with substantial losses.

There was a similar non-monotonic response in consumption. Professor Shapiro argues that consumption is likely to be a good measure of the overall well-being for this population group. They are typically no longer on the upward-sloping part of the life-cycle earnings profile, and should not be liquidity constrained. Thus, changes in consumption should closely track changes in lifetime resources. Overall, consumption in the CogEcon sample dropped by 3 per cent in response to the crisis. Those who lost more wealth report larger declines in consumption. However, those who have little wealth look more like those who had big losses than those who had more modest losses. The response of consumption to the crisis was fairly flat across the levels of cognition, which suggests that there might have been offsetting factors related to cognitive capacity – high exposure to the stock market among the high cognition group might have been offset by a greater capacity of high cognition individuals to buffer shocks.

Multivariate regression analysis shows that after controlling for financial losses which are positively correlated with having high cognition, high the cognition status appears to be a buffer against consumption declines during the crisis, and high cognition group does distinctly better in terms of the consumption response to the crisis compared to the middle and low cognition groups.

Several other papers presented at the workshop added further insights into different aspects of the financial crisis' impact on different economic agents. Békés et al. (2011) use the data from the European Firms In a Global Economy (EFIGE) to document the impact of the crisis on firms in 7 European countries – Austria, France, Germany, Hungary, Italy, Spain and the UK. They find that even though the crisis had a large negative effect on firms on average – it lead to a 12 per cent decline in sales, 11.6 per cent decline in export volume and 6 per cent of their workers were laid off, the firm response was quite diverse. In fact, more than a quarter of the surveyed firms experienced no decline in their sales. The response was similar across different industries, and across the firms of different sizes. Exporting firms appear to be affected more – an average exporter experienced a 3.2 percentage points larger decline in sales than an average non-exporter within the same country. Firms that outsource some part of their production and firms that control other companies did better during the crisis. Outsourcers witnessed a 1.8 per cent smaller reduction in sales. Firms that are controlled by other companies have reduced their sales by 4.2 per cent more than the average. On the other hand, firms that control other companies at home or abroad were able to preserve more jobs. They also find that firms relying on external finance suffered a greater decline in sales. However, this effect was quite modest – firm that rely on external finance suffered an additional 1 per cent reduction in sales compared to firms that rely more on internal funding. At the same time, they do not find any significant effect of the use of trade credit.

Demyanyk et al. (2012) investigate whether the decrease in house prices in the US has lead to a lower labor mobility. This has become a popular hypothesis attempting to explain, at least partially, the rise in unemployment in The

US during the crisis, finding support both in academic articles and in the popular press (for example, in The Economist, August 28, 2010). In their analysis, the authors use an extensive dataset from one of the three major Credit Bureaus in the US, TransUnion, which contains a large number of credit characteristics for consumers who had at least one non-agency securitized mortgage at any point in time between April 2005 and December 2010. This dataset was merged with the mortgage loan-level LoanPerformance Securities database provided by CoreLogic. This allowed the authors to obtain both the individual and loan characteristics. They also tested the robustness of their findings using the data from another major Credit Bureau – Equifax. In this paper, the authors do not find evidence of negative home equity locking households into their local labor markets and preventing them from moving to regions with better job prospects. To the contrary, they find that individuals with negative equity are more likely to move, in particular if the amount of negative equity is large, exceeding 20 per cent of house values, and that potential costs associated with disposing of an underwater property are outweighed by the benefits of obtaining a job.

Haltenhof et al. (2012) examine how firm and household access to credit has affected manufacturing employment in the US. Using a variety of micro and macroeconomic data, they conclude that access to credit has affected employment in the manufacturing sector mostly through changes in the average size of establishments, that household access to finance matters more than firm access to loans for employment dynamics, but that both credit channels (for firms and households) appear to have been economically significant in the Great Recession.

Masier and Villanueva (2012) investigate the heterogenous consumption of homeowners to the changes in loan conditions in Spain. According to economic theory, consumption of unconstrained homeowners should respond to the interest rate, while consumption of credit constrained homeowners is influenced by the size and timing of payments (mortgage maturity). The authors find that the consumption of households headed by an individual with a high school education responds more to mortgate maturity than to the interest rate, while the consumption of the rest of indebted households is insensitive to loan maturity.

Benczúr et al. (2012) use the data from the Hungarian Household Budget Survey from 1998–2008 and estimate the response of labor supply to taxation and transfers at the extensive margin. This is particular relevant for Hungary, given that the recent (and possible future) fiscal reforms here are centered around labor market activity, and given a very low participation rate in Hungary. Unlike most of the literature, they provide a unified treatment of taxes and transfers. They find that some subgroups that are highly responsible for Hungary's low participation rate (low-skilled, women at child-bearing age, elders) are relatively highly responsible to tax and transfer changes.

Endrész et al. (2012) investigate the issue which is very relevant for Hungary – the problem of foreign currency (FX) borrowing and currency mismatch in the balance sheet of firms. The ratio of FX loans relative to export in Hungary is not very high compared to other countries have experienced balance sheet type financial turmoil (Argentina in 2000, Mexico in 1994, Thailand in 1996). However, using a firm-level dataset, they find substantial heterogeneity among firms in Hungary. A significant share of firms with large FX debt has no natural hedge, i.e. no FX revenues from export. These firms exposed to currency mismatch had a sizeable share both in real aggregates and on the loan market before the crisis. Firms with currency mismatch tend to be larger and more indebted, which suggests that FX borrowing might have eased their liquidity constraint before the crisis. During the crisis balance sheet effects were likely to be triggered by the large depreciations. Firms with FX loans tended to have a larger decrease in the probability of making profit, a larger fall in investment, and were more likely to go bankrupt.

Beckmann et al. (2012) cast more light on the problem of foreign currency borrowing in Eastern European countries. They study the household sector FX debt, investigating the determinants of household arrears in these countries. Their findings suggest that FX loans increase loan arrears in countries that experienced currency depreciations, however, this increase is relatively modest. In addition, they find that arrears for both foreign and domestic currency loans are substantially higher in countries that experienced currency depreciation compared to non-depreciation countries, which suggests that, in addition to adverse balance sheet effects, currency depreciation have negatively affected loan repayments through other mechanisms, such as decreased households' income.

MODELLING MICROECONOMIC BEHAVIOR AND ITS MACROECONOMIC CONSEQUENCES

Several of the papers presented at the Workshop have explicitly modelled heterogeneous micro-level behavior of economic agents and investigated how it affects macroeconomic dynamics in different sectors of the economy, such as corporate finance, housing market or the banking sector. Motivated by the observed dynamics of the corporate finance structure in Europe during the last two

decades, and in particular during and after the financial crisis, De Fiore and Uhlig (2012) develop a model with heterogeneous firms that optimally choose between two sources of external finance – bank loads or debt securities. In their model, there is a continuum of ex ante heterogeneous firms who receive 3 types of productivity shocks. The first shock is public knowledge, and introduces ex ante heterogeneity. The second shock can only be revealed before the production at some cost. The last shock is known only to the enterpreneur after production, but can be monitored by an outsider at some cost as well. The firm needs to obtain a loan to pre-pay the factors of production. There are two types of financial intermediaries – banks that are willing to spend resources to acquire information about an unobserved productivity shock, and 'capital mutual funds' which intermediate bond finance and are unwilling to incure information-acruisition costs. Because information acquisition is costly, bond issuance is a cheaper but riskier instrument of external finance. In equilibrium, the firms that experience ex ante low productivity shocks and thus high risk of default choose to abstain from production and not raise external finance, which allows them to retain their net worth. Firms with relatively low risk of default choose to issue debt securities because this is the cheapest form of external finance. Firms with intermediate risk of default decide to approach banks, because they highly value the option of getting further information before deciding whether or not to produce. The authors consider the impact of three aggregate shocks that are designed to mimic the impact of the financial crisis: an increase in the 'iceberg' cost of obtaining bank financing, a decrease in capital quality and an increase in uncertainty. The results that they obtain can qualitatively replicate the changes in the composition of corporate debt which has been observed in the data during the crisis. In response to each of the aggregate shocks, their model produces a fall in the ratio of bank loans to debt securities, as a larger share of firms with high ex ante risk of default finds the cost of external finance too high and chooses not to produce. At the same time, a larger share of firms that experience intermediate realizations of the firm productivity shock find the flexibility provided by banks too costly and decide to issue bonds instead. This, in turn, increases the costs of both bond and bank finance. Bond finance becomes more costly as the quality of the pool of market-financed firms deteriorates. Similar effect obtains for the costs of bank finance, as the share of firms with low risk of default that move from bank finance to bond finance more than compensates the share of firms with high risk of default that move out of banking and decides not to produce. They can also quantitatively match the responses observed during the financial crisis when all three aggregate shocks are simultaneously introduced. Finally, they find that the firms' ability to shift between the two sources of external finance can smooth the effect of the aggregate shocks on the aggregate investment and output.

Forlati and Lambertini (2012) document the increase in 'exotic mortgages' during the pre-crisis period (2004–2006) in the US. The distinguishing feature of these 'exotic mortgages' is low early amortization – the reduction in borrowers' initial monthly payments. They build a model with housing and endogenous default, and use it to evaluate how the introduction of such 'exotic mortgages' has impacted the housing market, and whether it could have exacerbated the effects of the mortgage default crisis. They model the crisis as the sudden increase in the variance of the idiosyncratic shock to the house value (which they call 'mortgage risk shock'), relating it to the entrance of subprime borrowers in the mortgage market. They find that low early amortization increases housing demand, housing prices and the leverage ratio. At the same time, it amplifies the macroeconomic effects of the mortgage risk shock. This happens both through the steady-state effects – higher loans and housing stock lead to larger negative wealth effects following the shock, and through the dynamic effects, as borrowers stategically postpone default. As a result, there is lower default during the early periods of the mortgage life (when the consumer has to pay smaller payments and still enjoy the housing services), but much higher default in the later periods. There is also a negative second-round equilibrium effect, as both consumption and housing prices fall.

Caggese and Perez (2012) develop a model with financial and labor market frictions, and analyze the aggregate implications of the precautionary behavior of firms and households. In their model, financial frictions generate costly bankrupcy risk for rims and limited insurance against unemployment risk for workers. Precautionary decisions of households and firms interact to significantly amplify the effect of financial factors on aggregate output and unemployment.

Bluhm et al. (2011), motivated by the widespread concern about the increased systemic risk during and following the financial crisis, develop a dynamic network model with heterogeneous banks, whose links emerge endogenously from the interaction of their optimizing decisions and an iterative tatonnement process that determines market prices. They assume that banks hold liquid assets in the form of cash and deposits, and lend to each other in the interbank market to invest in non-liquid assets, such as bonds or collaterized debt obligations. At time zero, banks differ in their returns on non-liquid assets due to different information and administrative costs. This leads to

heterogeneous optimal portfolio allocation, and hence to demand and supply of bank borrowing and lending. The resulting banks' links are given by the cross-lending and borrowing in the interbank market. The authors use their model to investigate the systemic risk. They model contagion as a result of the transmission of shocks to non-liquid assets. Since banks are interlinked through the counterpart exposure in the interbank market, a defaulting bank transmits losses to creditor banks. At the same time, there is an indirect contagion through fire-sales – a negative shock in the value of non-liquid assets induces several banks to de-leverage, which produces a fall in the market price and a cascade of losses in marked-to-market balance sheet of all other banks. They also investigate the impact of prudential policies – an increase in the capital requirement ratio and a Pigouvian systematic risk tax. They find that the increase in the capital requirement makes financial system less interconnected and more homogenous. They also find that the Pigouvian tax is an adequate measure that reduces systemic risk, but its effect is non-monotone on all banks. They also find that there seems to be a trade-off between banks' stability and banks' investments in non-liquid assets, which they interpret as banks' links with the real economy. Thus, their results indicate that higher stability may come at the cost of a lower provision of financial products and services to the real economy.

CONCLUSIONS

The event presented an excellent opportunity for researchers who work in various areas of macroeconomics to present their work which documents the importance of agent heterogeneity and microeconomic behavior during the financial crisis. The two keynote speeches and the papers presented at the workshop made a strong case for moving towards incorporating agent heterogeneity in the standard macroeconomic models, arguing that this can strongly enhance our understanding of the aggregate economy and devise better policy responses to the crisis. In addition, lively formal and informal discussions during the workshop have provided a lot of interesting ideas for future research.

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Interview with Fabio Canova

(Katalin Szilágyi, István Kónya)

Fabio Canova is currently a full-time professor at the European University Institute (Florence). He has taught in numerous universities around the world and given professional courses at central banks, as well as held consultancy positions with the Bank of England, the European Central Bank, the Banca d'Italia, the Banco de España and the International Monetary Found (IMF). He is also program director of the Budapest School of Central Bank Studies. His research interests are in quantitative macroeconomics; monetary economics, time series econometrics and forecasting, international business cycles and growth policies. He has published over 70 articles in international journals and his graduate textbook, Methods for Applied Macroeconomic Research, *was published in 2007 by Princeton University Press. He has been ranked in the Econometrics and Applied Econometrics Hall of Fame and in the Top 100 most productive economists.*

– Tell us about your involvement with practical macro issues, including central banking.

Fabio Canova: I was interested in theoretical and applied macro issues but always from a theoretical point of view. So I wanted to see in practice how policymaking works. About 10 years ago I got involved at the Bank of England as an advisor, building their macro model, and from then on I did a bunch of other consulting activity with other central banks (ECB, Banca d'Italia), a bunch of Latin American central banks (Columbia, Argentina, Brazil). Essentially, my interest was motivated by their desire to use dynamic macro models, as developed in academics, and to see how they are employed in practical situations. And in the process I discovered a few anomalies, primarily due to the fact that they used these models in a different way from academics. That also stimulated some of my own research, because I could see a mismatch between what was available and what were their interests, and I tried to fill in with new tools and new ideas.

Katalin Szilágyi: What is the main difference between practical and theoretical macro modeling?

F. C.: There has been a convergence of interest between academic and central bank economists and that convergence is both in terms of tools and in term of languages. So the models that academics and central bankers use these days, are common. Their language is the same: people talk in terms of preferences, constraints, optimization, which was not the usual language in the past. Although there has been a process of convergence,the way macro models have been built by academic economists is very different from the way central bankers employ them. When academic macroeconomists build a model, they don't intend this model as being the true data generating process in the real world. A model, by definition, is a simplified representation of what reality is. And they try to derive implications, which allows them to understand better how the economy works. This is not the point of view of central bankers. Central bankers want a model to understand the economy, not a simplified representation of it. That is a very big mismatch. The way it is typically resolved, is that central bankers try to build more complicated models to add realistic features. The cost is making models much more complicated, larger and more complex to understand, and not necessarily better in terms of forecasting. Complexity generally makes it very difficult to understand the outcomes of these models. One of the beauty of academic economists' models is that it is relatively easy to understand the mechanisms driving their dynamics. It much-much more difficult to understand them in the typical models available at central banks. With hundred equations, the interactions are most of the time which are very difficult to disentangle.

K. Sz.: So is it better to have a small model? Can you afford to have a small model in a central bank?

F. C.: Well, again, it's a tradeoff. It's a big tradeoff. In the past, in central banks, there's been the idea that there should be one model. And this model should be built to explain every possible question that the management may ask. I think this is the wrong attitude, because we don't know the right model. We may have sub-models, which are good to explain different aspects of the economy, but we are not able to integrate them yet in one framework. Given these difficulties, I think it is much better to have small-scale models, specifically designed to tackle certain problems, and a bunch of them, not only to answer different questions, but also to answer the same question. Because a model may not be the correct representation of reality, you may want to cover yourself against mistakes you can make. Generally my advice in this respect is to have a suite of models: these could include a bunch of general equilibrium models, a bunch of time series models, and a bunch of semi-structural models. The task of the policymaker is simply to combine the information they provide into one policy decision. The work of a policymaker is essentially trying to combine these many inputs into one possible output, which is the decision making.

K. Sz.: But we perhaps still need a core model to put this information together in a consistent way. Or can we avoid that?

F. C.: You can do it in two ways. One is informally: there are different groups, which use different models, and they provide their input to MPCs or members of the board. And the members of the board see different possible scenarios, outcomes, and they combine them themselves in an informal way. The alternative is to use formal methods, statistical decision-making theory to combine the information of the output of different models, and provide policymakers with one outcome. I guess which option is taken depends on the preference of the policymaker. There are policymakers, who prefer to see different outcomes from different models, and then combine them in their own way, and others, who prefer just to see one possible outcome.

István Kónya: Is there a sort of honest way of doing that? Or is it very subjective?

F. C.: Again, it depends on the preference of the policymaker. I can give you an example of the Federal Reserve Board at the time when Greenspan used to be there. He did not like models. He had the answer to most of the questions, except in a very small number of cases. In the latter case, he asked advise and when people presented scenarios, he picked the model which matched his prior, rather than combining their outputs. That's a fine statistical criterion: you want the model to replicate some stylized facts, which you have in mind. And it is perfectly legitimate, under a particular loss function. If you tell me what is your loss function I can give you an optimal criterion. If you don't give me a loss function, then I am not sure I can do a statistically optimal or credible way of combining different outputs.

– Macroeconomics has been heavily criticized for not being able to predict the crisis. Do you think this criticism is justified? What do you think were the main problems with pre-crisis macro?

F. C.: Yes, true, we've been criticized a lot. But my usual answer here is: when there is an earthquake, do seismologists get criticized because they can't predict earthquakes? Or when there is a volcano eruption, do volcanologists get criticized? It's a rare event, typically we do not have many observations to predict, so the best you can do is to develop some early warning indicators. It's true that people did not pay enough attention to early warning indicators in this case. There were some indicators, which kind of told you that we were not on the right track, but that did not necessarily mean that the probability that the crisis would occur was high – financial and banking indicators were poor also in other situations that did not lead to a crisis. In that sense, I think the criticism is wrong. So I think the lessons that people should learn from the crisis – I don't know if we should call it current or past crisis, is that there should be a lot more monitoring. Not just macro variables or financial variables, but also monitoring of micro data, of balance sheets. And trying to assess if parameters essentially have gone out of the range that historically have been standard in the world economy.

I. K.: People are very good at inventing new theories. So the stock market breaks through, I don't know, 10,000 and we are in a new economy, justifying that. I guess that's just human nature.

F. C.: There is a tendency to behave like this. I mean, on the one hand, it was more than 50 years that no one saw a big crisis in the developed world – historical memory plays a role here. One of the things we like to assume in a lot of fields is what's called ergodicity which means the memory just fades out; if something does not happen that often, then the probability essentially declines and we pay less and less attention to these things. It's not a criticism; simply the probability that a crisis like this has occurred was very small a priori. Now that it occurred, it is easy to say 'yeah, I could predict' or with hindsight say, 'yeah, if we had looked at these indicators, we could have predicted that'. Ex-post everybody can do that. I don't see that as a very academic way of looking at problems. I don't see the idea of creating theories ex-post it as a very practical way of proceeding. The general story is that many important actors failed to monitor the economy. Again, looking at microdata, is crucial, even if for macroeconomists it is something relatively new, looking more at heterogeneities, asymmetries. This I think, is the lesson to learn here.

– There are many efforts to improve on DSGE-type models including financial and other frictions. Do you think preserving the core RBC paradigm is the right way to go, or should we try something completely different?

F. C.: The question is: what's the alternative? My favorite take here is that since there is no true model, the best you can do is having different models on the table, and trying to understand what are their structures, and their implications. I think the current models with this RBC paradigm, which I understand meaning rational expectations plus optimization, are obviously a useful benchmark to understand how far you are from this ideal world, and they are perfectly ok for academic purposes. Again, for central bankers they may not be what you want. There has been some development, for example, eliminating rational expectations, adding learning, in these models. Others have started using the idea of rational inattention: people pay attention only if the signal brings you to a completely different area; if it is a small signal you just don't pay too much attention. So I think there are improvements, but they are going to complicate quite dramatically the setup. So my best take is: let's have models in which we can do storytelling, like DSGE models. Let's have models, which are good at fitting the data. Let's have models, which are good at forecasting. Let's try to see how different it is what they predict. And if they predict roughly the same thing, then that's fine. If they have differences, then try to understand what the difference is, and either pick or combine the outcomes of different models.

I. K. Have you had any experience with agent-based models? They are sometimes advocated as alternatives, to building from the ground up, using simple heuristic rules but having kind of complex interactions of the agents, so basically abandoning rational expectations, even equilibrium.

F. C.: My impression is that these modes are not, mathematically, sufficiently developed. I mean heuristically they are fine, but they are not sufficiently developed to give you a precise answer to a question. If your governor wants to know, what do I do if the exchange rate is too high, do these models allow you to answer this type of question? I'm for the proliferation of models. I don't think having one point of view only is the best way to approach economic questions. I think variety here gives you a much better understanding of issues. And variety also gives you a way of improving your models in a way or the other. You can take up different models and try to combine them in a hybrid setup, which has different features. But I have been trained with rational expectations, and I think it's still very useful. RBC and rational expectations I think are very useful benchmarks to understand how the true economy differs from this ideal world.

– One of your main research areas is to try and reconcile the tight structure of DSGE models with the flexibility needed to match the data. Can you elaborate on this a bit?

F. C.: This is not easy. I think there is a tradeoff here: giving up some of the tight structure does not allow you to interpret your model as before. On the other hand, it may allow to do better in forecasting. So there is obviously a tradeoff here. I remember when I was at the Bank of England these two objectives were clearly specified in the model. There was a part of the model, which was used for interpretation, and a part of the model, which was used for forecasting. The structure was unique, but there were features which were turned off or on depending on the scope of the analysis. When the scope was simply interpretation, then the more flexible part was turned off in the model. When you were doing forecasting, both could be useful, both the structural part and the less structural part were used. I think depending on the objectives, it is not a bad idea to have a structure like this. Ideally, we would like to have a model, which does both. We are not there yet, so we have to compromise. Models like DSGE-VAR models, DSGE-factor models are essentially ways to combine different sources of information in a way that help you to catch two birds with one

stone. I am not sure if they've had a lot of applications in central banking yet. But there are at least some regional FEDs who are using these mixed frameworks. Obviously, it is very important to specify what's your objective function, your loss function before you do anything like this. In principle, there could be even complete separation of the two, and choose, for example, a model for forecasting, just for forecasting, and I am going to build a model, which is optimal for that, and a model for interpretation purposes. I don't see anything wrong with that.

– What do you see happening in central bank modeling and forecasting after the crisis?

F. C.: Yes, I think there has been at least couple of changes I have noticed. First of all, there is much more attention to micro data. When I talk about micro data, it's not simply banking data. For example, I am talking about differences in labor markets; I'm talking about how imbalances in one country feed into imbalances in other countries. I am talking about cross-country, cross-region, cross-market links. At the ECB, before the crisis, people were talking constantly about the Euro Area. Everything was the Euro Area. Now they are talking about how the economies of the Euro Area interact with each other, and how a shock generated in a particular region can be transmitted. The general idea here is simple: if a country sinks, the Euro Area will sink. It would be the Euro Area, not just some countries in the Euro Area. A few weeks ago someone told that the Euro area was like the Titanic: when it hit the iceberg not only that third-class passengers went down, also first-class passengers did. If there is a disaster, there is a disaster for everybody. For this reason, there is much more attention to these interactions then in the past. And there is also much more awareness now of the possibility of extreme events. I don't know if it's an exact characterization, but my general impression is that before the crisis, the loss-function of policy makers was close to quadratic, they weighted up and down from the target more or less the same. Now there is a much more important penalty for getting it completely wrong. So the worst possible outcome now is becoming something that you want to try to avoid as much as possible.

K. Sz.: Can I ask something about this micro data – you mentioned it already twice. What kinds of data are gaining importance?

F. C.: Definitely there is much more monitoring of bank balance sheets, for example. But I'm thinking also of, for example, how regional economies behave, the finances of regional governments, rather than the overall balances of a country. How these impact, for example, on national deficits and what repercussions they may have. I'm thinking about how imbalances in labor markets in a particular region may spread out. The general awareness is that the world economy is not homogeneous and attention should be paid to that because heterogeneities may create imbalances which may turn out to change the outcome at the macro level or aggregate level.

– It has been argued by Peter Howitt that the connection between central bank practice and academic macro research is much weaker than academic economists would like. What are your views on this, and how should interaction be improved?

F. C.: Well, I already implicitly answered to this. I wouldn't be as negative as Peter on this. I think there has been a lot of convergence. If I look back at what people in central banks used to do 20 years ago, I think we are much closer now. Still there are differences, essentially in objective functions. For example, often because of the structure of central banks institutions, central bank economists just pick models build in academics, and use them for their own activities. That may not be the right way of proceeding, simply because the objectives are different. Again, the tradeoff between good empirical fitting and some macro storytelling, is not particularly interesting, nor particularly developed in academic economics. As long as you match some moments, that's fine. An extreme characterization would be that central bankers are much more interested in tracking the time series, like engineers, meteorologists, or the military. You don't care that much about the average; you want to hit the particular target. Academic macroeconomists happy as long as the average is right, how you get there is not particularly important. Or at least it's not as important as (in central banking). Once I was in a central bank and I have asked them: you are inflation targeters, what is it that you dislike, level difference, or variation? They answered we never thought about it. But that is important. If you don't like level differences, you may choose policy paths that are different than those you follow if you do not like variation around that. In general some of the tools developed for academic economists do not fit exactly the objective functions of central bankers. But again, we have made a big improvement relative to what it used to be 20 years ago, definitely.

– Central bank forecasts try to balance numerical accuracy with meaningful storytelling, and expert opinion with macro modeling. How can this tradeoff be resolved in a meaningful way?

F. C.: I don't think there is an easy way to get a solution here. The best way to proceed would be to approach the problem from a Bayesian viewpoint, recognize there is model uncertainty, parameter uncertainty, and stochastic uncertainty and try to design some kind of optimal decision rule, which takes this uncertainty into account. You don't like the worst possible outcome, then build a loss function, which given the uncertainty you face, tries to minimize this worst possible outcome. There are lots of papers in macro, which try to find the optimal policy conditional on a particular model. But how do we know that this is the best model? Others find the optimal policy log-linearizing the decision rule, or taking a quadratic approximation of the decision rule. How do we know that this is enough? There are a lot of uncertainty, which are not taken into account, and probably the best answer here would be to try to robustify decisions; at least in the direction that you care most about. Given potential numerical difficulties, the question is, how much we want to push in that direction. If you are happy with some kind of approximation, I would work more on the side of parameter uncertainty and model uncertainty. I don't know if here *(in the Magyar Nemzeti Bank – the editor)* it's the same, but in central banks there has always been an attempt of separating expert opinion and macroeconomic modelers primarily because it is very difficult to make them talk the same language. But I think this is possible: there is a lot of information that these expert opinions have, which is not used in macro models. I'm thinking about consensus forecasts, specific information they have about micro-economy, and micro-markets that have no use in macro. People now are working on adding all this information to macro models. There is a very recent paper by *Schorfheide* and *Del Negro*,[1] which is going to be in the *Handbook of Economic Forecasting* some time in the future, in which they are trying to use this information. And surprisingly enough, they show that if you add information in real time, your understanding of the financial crisis could have been dramatically improved. To be clear, the DSGE model is standard, but extra information, which was available and no one looked at the time when it was produced, is used. Here the information set you have may be more important than the model that you use. There is a lot of essential information in expert opinion, which is simply disregarded in more formal macro models.

– Being an Italian who spent many years in Spain, and who is married to a Greek macroeconomist, you probably have strong views on the current Euro crisis. Any thoughts you could share with us on this topic?

F. C.: So now we have the final, the Mediterranean question. Yeah, I do have a strong opinion. I think the Euro crisis is the result of politicians, more than economic actors; politicians failing to understand exactly the consequences of their actions; failing to understand the dynamic implications of their choices; and essentially playing with fire. Any reasonable economists could have told you 20 years ago when the Maastricht treaty was signed that there was no easy way to get out of a crisis, given the setup that was designed – there was no exchange rate devaluation, or an easy way of readjusting the economy. The only available option was defaulting. Over the last 20 years, it was a very low probability event, but it happened and politicians simply disregarded the problem, thinking it will solve itself. I attended a talk by Charles Wyplosz in December, which was very-very informative, at least visually informative. He plotted the spread dynamics of the ten-year bonds against the German bund, against the meeting of the political leaders. And the day after every meeting they had done, the spread increased, every time.

I. K.: Pre-crisis, as well as during the crisis?

F. C.: Since the situation of Greece was known. Every time they met and every time they agreed to have found a solution, the reaction was there. The day in which they announced, the spread fell, meaning the market thought they found a solution. As soon as the markets processed the details, and found them either unspecified, smoky, or not clear enough the spread rose. They created a rescue fund but it was not big enough to rescue anybody and measures like this. The reputation, built over the last 10 years of relatively good management, has been totally lost. My impression is that now politicians are really playing with fire, in the sense that – and I said that before – not only third-class passengers will sink, also first class passengers will sink. Poeple know that the problem is general, that you have to find a way to solve it, but they act as if it doesn't concern them. I've seen recently an estimate that claims that if the Euro breaks, German GDP will fall by 10 per cent and the unemployment rate will increase by 4-5-percentage points. My

[1] Del Negro, Marco and Frank Schorfheide (2012), "DSGE model-based forecasting", *Staff Reports,* 554, Federal Reserve Bank of New York.

solution is simple. First, clean up the mess and then make new rules, not the other way around. Politicians seem to think exactly in the opposite way. First, we make the rule, which will become operative by 2020 or 2025, and that will help us to drive the economy out of the mess today. The problem is that the mess is so big that unless something is done the economy will break. I just don't see the right actions being taken. There are simple actions I think, which will calm down markets, make borrowing and the adjustment easier. In the current conditions, there is no chance for Greece or Spain to readjust – it will take forever. And the adjustment will have repercussions everywhere in Europe. So it is not just a problem of the Mediterranean, it is a problem of everybody. Politicians – probably because of electoral conditions – do seem not to understand. But, as I said, they are playing with fire. The amount of money, which is now circulating in financial markets, is enough to sink the European economy if they really want to do it. There is no way that the Spanish government will be able to afford 7 per cent real interest rates on their government bonds for more than a very-very short amount of time.

K. Sz.: What should be done?

F. C.: My solution is radical. The ECB should use its capital to buy government bonds. Not all of it but, say, a large amount. Or – which would be the same essentially – slowly inflate away this amount. The second thing I would do is to create a central authority with some taxing power to be able to back this up. Unless you proceed this way, there is no way to convince the market that the policy is feasible. Once the situation is stabilized, then rewrite the rules. But these rules should be very-very simple, otherwise they are not going to be enforceable, as the Maastricht Treaty rules that have never been enforced. The idea to solve the problem with a balanced budget every period is wrong, I think, but balanced budget over, say 4-5 years, seems a reasonable target, you can adjust to. And if this is not enforced, there should be some measure, but not fines. The government should step down; it should be taken over by some kind of supernational authorities. I mean if there is someone irresponsible, and he is threatening your house, you want to take measures against them. I think there could be different ways of doing this, but you need some kind of clear and enforceable rules. Until you see politicians going to these Euro area meetings and saying, 'yes we are going to balance the budget', and then announcing the day after that the deficit will be 5 per cent of GDP in that year, what kind of credibility the institutions will have? What is missing right now is a realistic assessment of the situation, and an understanding on how to solve the short-run problem without endangering the long run sustainability of the economy. I think it is wrong to have default as the only way of rebalancing distorted economies. The situation is difficult, but there should be some other mechanism of adjustment, which is now not there in place.

K. Sz. and I. K.: Well, thank you!

Publications of the Magyar Nemzeti Bank

All publications of the Magyar Nemzeti Bank on the economy and finance are available on its website at http://english.mnb.hu/Kiadvanyok. From 2009, the publications have been published only in electronic format.

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